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ABSTRACT

In May 1987 a regional workshop was organized in Japan under the technical assistance program of the Asian Development Bank with the collaboration of the Asian and Pacific Skill Development Programme of the International Labour Organisation and the support of the Ministry of Labor of the government of Japan. The workshop addressed the major issues in developing effective technical trainers in the participating countries. The main body of the book incorporates resource papers presented and discussed in the workshop. Three subthemes provide the scheme by which the papers are classified. The first subtheme, Developing the Framework, includes papers that highlight the importance of linking training programs with other national development efforts. The second subtheme, Developing the Systems, discusses principles and practices necessary to develop more effective training systems. Finally, the third and largest part of the book includes papers addressing the subtheme of Developing the Instruments. These papers discuss the various mechanisms successfully used in a number of countries to make the training effort significantly more effective. The last section of the book outlines conclusions and recommendations of the workshop relating to nine areas: (1) training policy; (2) training staff; (3) training curriculum; (4) training materials; (5) training approaches; (6) training standards; (7) training research; (8) regional cooperation; and (9) technical assistance. (GL)

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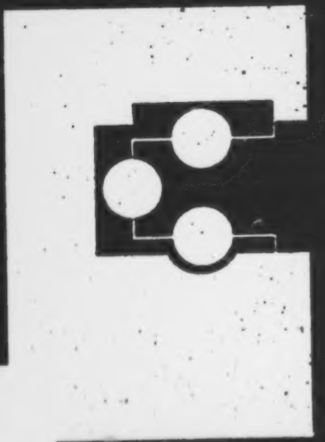

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TRAINING THE TECHNICAL TRAINER

ISSUES AND STRATEGIES

ASIAN DEVELOPMENT BANK
Manila, Philippines

Training the Technical Trainer

Based on papers presented at the Workshop held in Chiba City, Japan, from 13 to 23 May 1987, under the auspices of the Asian Development Bank, the Asian Pacific Skill Development Program of the International Labour Organisation and the Government of Japan. The views reflect those of the authors and not of their organizations.

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FOREWORD

Training has consistently been an important part of the Bank's development activities in its developing member countries. But it is in relatively recent years that the training of the trainers themselves has emerged as a critical dimension of the effort.

At a conference of Asian and Pacific Labor Ministers held in Manila in 1980, it was recognized that, for skill development to be effective in the region, it was vital that the authors of such development should be the first to be equipped with better skills. Technical and vocational teachers as well as trainers represent a key cadre of change agents. Therefore, to strengthen their knowledge, skills and attitudes is a task that must figure high on the developmental agenda.

In May 1987, a regional workshop was organized in Japan under the technical assistance program of the Bank, with the collaboration of the Asian and Pacific Skill Development Programme of the International Labour Organisation and the support of the Ministry of Labor of the Government of Japan. The Workshop addressed the major issues in developing effective technical trainers in the participating countries, and spelled out the implications of alternative strategies.

The current volume attempts to capture the ideas articulated at the Workshop for further analysis and, it is hoped, wider use. It underscores the framework needed to reinforce technical trainer development in the region, highlights the systemic issues to be resolved in several countries, and discusses some specific instruments of potential significance.

I commend this book to the attention of the development community, and take this opportunity to thank our collaborators whose support made it possible and worthwhile.

Mr. Manish Nandy, management consultant and author, has edited the book on behalf of the Bank.

S. V. S. Juneja
Director
Infrastructure Department
Asian Development Bank

PREFACE

The importance of technical skills in the development process is beyond dispute. Equally indisputable is the critical role of technical teachers in improving, spreading and updating skills. This in turn makes it important for development agencies to make sure that the trainers themselves have been beneficiaries of a conscious educational process.

The May 1987 Regional Workshop in Chiba City, Japan was designed to take a comprehensive look at trainer development in the Asian and Pacific region. Twenty-four representatives from nineteen countries participated in the Workshop, and 14 resource persons contributed papers on a variety of subjects and assisted the country representatives in their deliberations. The essence of all these contributions has been sought to be preserved in the present volume. We believe its importance derives from the significance of the subject as well as the depth and pragmatism of many of the articles.

Another valuable resource the Workshop generated was a collection of 19 country papers put together by the representatives from as many countries. The papers will be retained by the Asian Development Bank as well as the Asian and Pacific Skill Development Programme of the International Labour Organisation, and will be made available to interested professionals and researchers.

I should like to thank the participants, observers and experts who made the Workshop the special occasion it was. I am particularly thankful to Mr. Rony V. Diaz and Mr. Jamal Ud-Din of the Asian Pacific Skill Development Programme who guided the Workshop, Mrs. Hisami Kurokochi of the Ministry of Labor, Japan, and Mr. Neil R. Collier of the Asian Development Bank who inaugurated the program, Mr. Masayuki Nomiyama of the Ministry of Labor, Japan, and Mr. Gunther G. Schulz, Vice-President of the Asian Development Bank who led the closing ceremonies, and Mr. Takao Nagata and Mr. Kazuo Sasaki of the Workshop logistics, and at the same time took extraordinary care of their guests. Mr. William Webb coordinated the entire event on behalf of the Bank.

G.H.P.B. van der Linden
Manager, Education Division
Asian Development Bank

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Introduction

Manish Nandy

It is well recognized that development is a skill-dependent process. It is both propelled and sustained by a higher level of skills. But, to identify the critical skills needed by a country, to generate them on the required scale, and then to ensure their effective dispersion in the appropriate sectors, is an admittedly colossal task.

Whatever be the strategy for managing that task, it is widely agreed that a large, capable body of trainers is essential. Developing countries have to rely on indigenous trainers to map areas of skill deficiency, understand the relative needs of different sectors, design curricular guidelines, locate and develop instructional material, and deliver the programs well despite limited resources. The trainer's is a complex, many-splendored role.

Clearly, the role will not be well played unless the trainers are instructed to play it well. In particular, the technical trainers, who must pass on to their pupils specific skills in a trade, have to know the skills as well as the means of passing them on. In other words, they must possess first-order expertise in content, in the concepts and applications of a subject, and also second-order expertise in process, in the principles and practice of pedagogy. Such expertise is acquired only over time, given a conscious provision of resources and instruction.

In most developing countries, the resources that assist technical trainers are deficient and will continue to be so. The facilities are rarely ideal; equipment is often limited, old or otherwise unsuitable; libraries lack needed texts and reference books; the budget for training materials is scant, at least inadequate; resource persons trainers can turn to for help are nonexistent. Hence, the need is even greater to provide the trainers with sound instructional assistance.

Training for technical trainers has thus emerged as an item of priority for developing countries. It has a robust multiplier effect and is a key to achieving large-scale improvement in skills in a relatively short period.

The role of the technical and vocational teacher trainers, the trainers of trainers so to speak, then has to be acknowledged as critical. Their effort is crucial to the business of transferring technology, first through the trainers and then through the trainees, into the fabric of a developing society. Because they train trainers, they exemplify as much as they teach: they teach by example as often and as effectually as by precept. Their influence is far-reaching.

The reality however is that, in several developing countries of the Asian and Pacific region, the training of technical trainers is yet to be accorded the importance it merits. The infrastructure that exists for their skill development – institutions, staff, systems, resources – is both insufficient and unavailing. The trainers in consequence lack the requisite skills to be effective mentors; in time, obsolescence dulls and rusts their skills even further. The interns they instruct in turn graduate without the proficiency the economy demands of them, initially or eventually. Their schooling turns out to have been largely a waste.

Change Agents

In 1980, a Conference of Asian and Pacific Labor Ministers in Manila placed the emphasis squarely on the issue of integral skill development in the region. It explicitly recognized the need for national schemes to develop technical teachers and trainers, including a blueprint to develop "a corps" of technical teacher trainers. The Conference held that the latter would be the key change agents in achieving the higher level of skills needed to meet future human resource requirements. It passed a resolution calling on the Asian Pacific Skill Development Programme, one of the programs of the International Labour Organisation, to assist the countries of the region in evolving a game plan for training of trainers.

This led to the formation in 1982 of an international team of 13 experts, comprising seven representatives from the Asian region and six from European countries. The team drew up a Five-Year Plan of Action, the focal point of which was the formulation of cost-effective schemes of national training. Since the countries had different national priorities as well as markedly different training systems, the team recommended three subregional workshops to study the special technical trainer training needs of each subregion in some depth.

The first subregional workshop was held in India in 1982 with the participation of Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka. It was followed by one in Indonesia the next year with participants from Burma, Hong Kong, India, Korea, Malaysia, Nepal, Philippines, Singapore, Sri Lanka and Thailand, and by another in Japan three years later with representation from Australia, Fiji, Japan, Kiribati, Solomon Islands, Tonga and Western Samoa. In addition, representatives from employers' associations and workers' organizations attended all the workshops.

The three workshops aimed at developing regionally relevant concepts, which could be the ingredients of country-specific training strategies. The idea was that the participants would bring to the workshops the fruits of their national experience and help generate a heightened awareness of common problems. Also, the expectation was that they would return with a clearer perception of more successful approaches, and could better integrate them in national plans.

These were coupled in 1983 with a policy-level consultative meeting, sponsored by the Asian Development Bank, which brought together in Manila senior government representatives from 11 Asian countries. The meeting concentrated on design and content issues and tried to resolve the important implementation problems.

As a result of the meeting and the workshops, several of the participating countries initiated training programs, curriculum reviews and modernization of materials and methodology. A large number of new activities started in particular in the field of trainer development.

Common Issues

Some common regional problems surfaced in the areas of curriculum development, strategy formulation, and trainer conditions. In the first place, many of the developing countries found it difficult to ensure that their programs were constantly in tune with industry and country needs. The very methods of curriculum development had to build a bridge between shifting social demands and program responses. Second, they also found it difficult to introduce new systems and implement changes even where a consensus existed about their desirability. They needed help in developing a strategy for change. Third, all improvement presupposed an energetic, motivated class of trainers, whereas the actual conditions of work and employment precluded a number of countries from hiring the best performers or even drawing their best performance. There was a need to identify where remedial action was needed.

To address these issues, a major regional workshop was scheduled in Chiba City, Japan, in May 1987. Planned and financed jointly by the Asian Development Bank, the Asian Pacific Skill Development Programme and the Government of Japan, its objective was to discuss the strategic and programmatic concerns of participating countries and come up with directions for the future.

Accordingly the Workshop brought together representatives from Asian and Pacific countries, policymakers, educational planners, curriculum developers, technical teachers and vocational trainers, along with officials of governments, trade and employer associations, and workers' organizations. The representatives belonged to:

Developing Economies: Bangladesh, Burma, China, India, Indonesia, Malaysia, Nepal, Philippines, Sri Lanka and Thailand;

Newly Industrialized Economies: Hong Kong, Singapore and South Korea; and
Island Economies: Cook Islands, Tonga and Western Samoa.

The Workshop extended over two weeks and its detailed program is appended as an Annex. Resource persons presented theme papers in plenary sessions, and a general discussion ensued, trying to link the conclusions to country issues. Later on, working groups including both country representatives and resource persons examined pertinent issues in detail and prepared a report for further review by other working groups and available experts. Then the findings were reported to the Workshop for a final review and confirmation. Finally, all the conclusions and recommendations were integrated and approved by the workshop participants; these are embodied in the section Workshop Conclusions and Recommendations.

Resource Papers

The main body of this book incorporates the resource papers presented and discussed in the Workshop. To an extent all of them have been modified and edited in the light of the discussion. However, they still represent the views of individual contributors and not of the organizations with which they may be currently linked. Inevitably they exhibit a somewhat variable emphasis on relative priorities; no attempt has been made to mitigate such variety for both ethical and polemical reasons. The articles speak with the same voices that their authors did.

The common subtheme of the first part of the book is *Developing the Framework*. It focuses on the larger framework that must guide the training endeavor of developing nations. *Bermant* suggests a policy scaffolding to integrate training policies with other human resource policies and avert the interdepartmental conflicts that weaken some national efforts. *Nandy* sets up a hierarchy of operational criteria to assess the efficiency of training and highlights the barriers to efficiency in developing countries. *Diaz* underlines the benefits of technical cooperation among developing countries and describes some of the programs that are currently afoot under the auspices of the Asian Pacific Skills Development Programme. *Powell* rounds up the section by sketching some major changes needed to lend greater efficacy to technical teacher training in the region.

The second part of the book centers on the subtheme of *Developing the Systems*. It discusses the principles and practices necessary to develop more effective training systems, including a training cadre, in the

Asian and Pacific countries. *McCaig* provides a global setting by analyzing why trainers currently do not act as change agents and what can be done to alter the situation. *Powell* sums up the available research findings on factors that help or hinder the learning process, emphasizing their significance for system-building. *Lacson* states the powerful case for integrating national training efforts and making them cost-effective. *Abrillo* reports on the findings of an empirical study on the job conditions and attitudes of trainers, stressing the paramount problems and the urgent need for action. *Norton* details an alternative, performance-based approach to trainer development which has produced results in other countries and is worth the consideration of Asian countries. *Tachikawa* narrates the salient features of the verification system for trade skills Japan has developed and is using with evident impact.

The third and largest part of the book revolves round the subtheme of *Developing the Instruments*. It discusses the various mechanisms successfully used in a number of countries to make the training effort significantly more effective. *Yasue* describes the module training system in Japan, taking pains to emphasize its unique character. *Ud-Din* describes the process of developing a more socially relevant curriculum, grounded in the needs of local industry and trade. *Norton* distinguishes competency-based education from traditional time-based education and argues its merits for both the trainees and the trainers. The *Hunts* show the advantages of computer-aided training, including the strengths of modern authoring systems. *McCaig* highlights the importance of software in developing countries and reviews alternative strategies for software development. *Lacson* explains the rationale and role of national resource centers, urging the crucial support it can give to a country's training plans. *Powell* suggests some models of technical cooperation feasible for the Asian region and spotlights a few innovative initiatives. Finally, *Buck* and *Mitchell* write about the monitoring and evaluation of training, using as their base a training model successfully adapted from the context of a developed country to that of developing countries in the region.

Main Conclusions

The conclusions the country representatives reached on the basis of their discussion of these papers, as well as the recommendations they made for future action, constitute the last section of the book. The conclusions and recommendations relate to nine areas: training policy; training staff; training curriculum; training materials; training approaches; training standard; training research; regional cooperation; and technical assistance.

The Workshop identified training policy as a major area of concern and urged the development of an integrated policy as critical to all further progress. Since in most governments training activities are distributed over two or three ministries, the absence of a coordinating mechanism was seen as a prime obstacle.

The Workshop assessed both the quantity and quality of training staff in most countries of the region as unsatisfactory. It saw the need for improving trainers' remuneration as well as for linking it better with their actual performance.

It stressed the importance of regular review and modernization of curriculum, and recommended that training institutions make greater use of private industry resources and regional exchanges such as faculty visits and joint ventures.

It called for greater sharing of training materials and for more systematic adaptation of written and audiovisual materials developed by private industry and by advanced countries.

The Workshop welcomed the evaluation and pilot usage of new training approaches such as computer-based learning and competency-based training. But it advocated a very careful assessment of relative costs and benefits before wider adoption of such approaches.

It also advocated national training standards and training research in selected areas of priority.

Finally, the Workshop recommended greater regional collaboration in the development of policies, certification standards, training materials and research plans. It urged technical assistance from multilateral agencies to initiate and improve programs of research, faculty exchange, instructional material development and regional workshops.

PART ONE

DEVELOPING THE FRAMEWORK

Policy Framework for Trainer Training

Michael Bermant

In the following, we will consider all those who are preparing students or trainees for a specific occupation or trade. We will include trainers, technical trainers and technical teachers, that is, all those who are teaching or training in the formal technical-vocational educational training system.

We will treat trainers as representatives of the training profession. In that sense, trainer training is not different from other professional training such as that of a physician, attorney, accountant or commercial pilot. To develop a policy framework for the training of trainers, we will apply a general approach for describing and analyzing the human resources development policy which was developed by the International Labour Organisation.

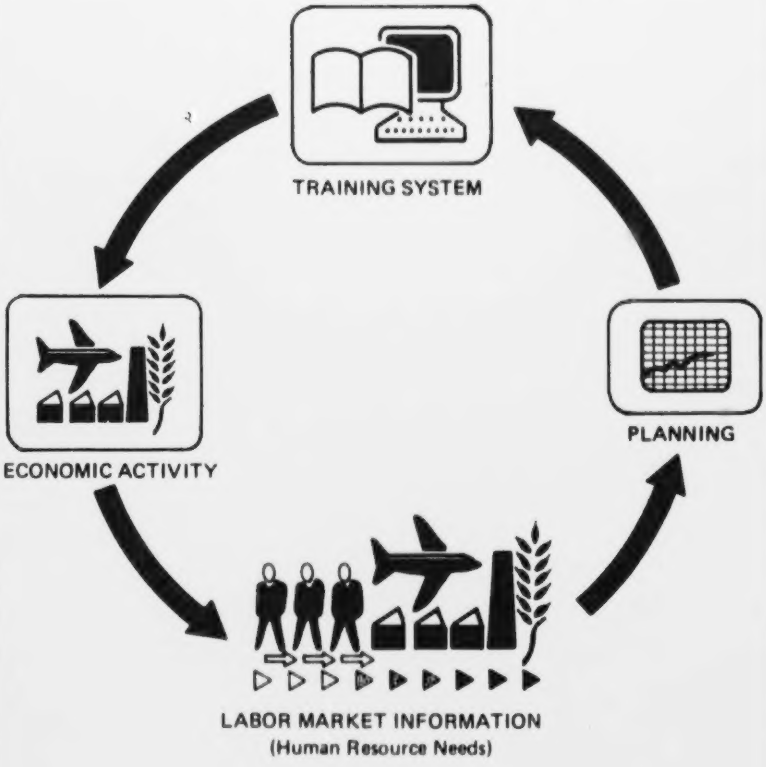
THE HUMAN RESOURCES DEVELOPMENT AND UTILIZATION SYSTEM

The importance of human resources in a country's development strategy is widely recognized. But the effectiveness of human resources development (HRD) policy in improving socioeconomic conditions has been extremely difficult to assess. Two major reasons account for this difficulty. First, the numerical data and indicators that are generally used to report on training activities fail to provide a satisfactory description of the human resources development system and give only a partial image of its effectiveness. In particular, the structural characteristics of the system and the qualitative aspects of its functioning are often ignored. Second, the absence of established statistical standards on training further impedes national and cross-national comparisons.

In this paper, Human Resources Development and Utilization (HRDU) is depicted as a comprehensive feedback system. Figure 1 illustrates the interdependence between different subsystems and components of the whole system. Economic activity generates labor market information about the human resources needs of the economy. The information is fed into the planning process, and the plans are then transferred to the training system where training objectives and programs are formulated. The output of the training system, the graduates, in turn becomes an input into economic activity and closes the loop.

An analysis of the system permits us to describe the HRD policy as an hierarchical set of policies. At different levels of aggregation, the HRD policy goals are identified, highlighting how the goals of various policy components are formulated and how they could be achieved. The

Figure 1
THE HRDU SYSTEM


TRAINING SYSTEM
ECONOMIC ACTIVITY
PLANNING
LABOR MARKET INFORMATION
(Human Resource Needs)

analysis can show the system's strengths and weaknesses and identify them for government decision or management intervention.

In a country, HRDU occurs in a broad policy framework established by a higher authority such as a constitution or an act of parliament. The latter specifies the objectives and guiding principles, and identifies the funding sources and roles of the training parties.

In reality, the HRDU system is decidedly more complex, and Figure 2 attempts to depict its more detailed structure. Its major subsystems are:

- Potential Training Population;
- Training and Retraining; and
- Economic Activity.

These subsystems interact with one another through two intermediate elements: the Enrollment Process and the Entry-into-Work Process. The Enrollment Process connects the Potential Training Population and Training subsystems while the Entry-into-Work Process links the Training and Economic Activity subsystems.

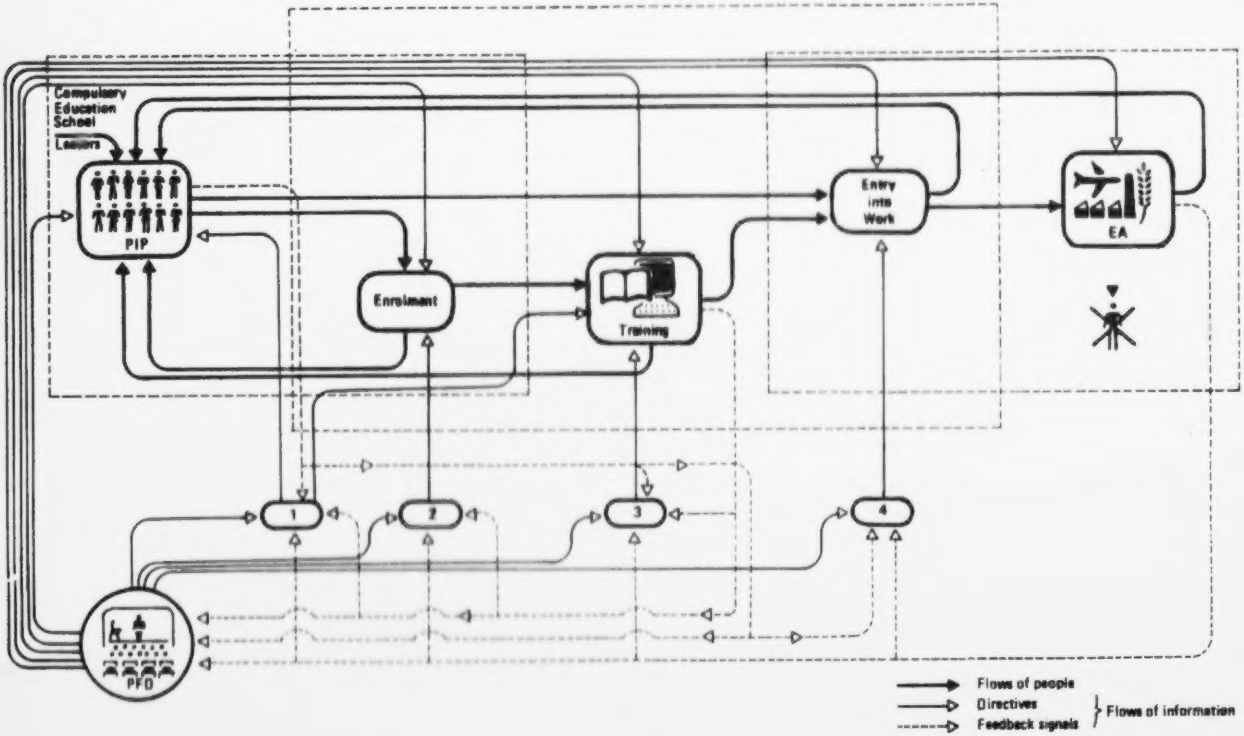
The larger boxes in Figure 2 represent the three subsystems and the smaller boxes the two intermediate elements which pertain to either one of two neighboring subsystems. The intermediate element, Enrollment, could be a part of the Potential Training Population or of the Training subsystems; the other intermediate element, Entry-into-Work, could be a part of Economic Activity or Training subsystems. The thick arrows show the flow of people among the subsystems and the intermediate elements. The thin arrows indicate the flow of information: dotted lines represent feedback signals, and the solid lines directives from the information processing and decision-making mechanisms.

The Potential Training Population (PTP) subsystem consists of employed or unemployed people. It includes: general compulsory education school-leavers who are either graduates or dropouts; unsuccessful training applicants; dropouts from training institutions; and either retrenched or retired persons from the workforce. PTP also includes those who are employed, but still want to either upgrade their competencies or to acquire new knowledge and skills. These people can enroll for training on a part-time or full-time basis. As seen from Figure 2, the outflow from PTP consists of training and job applicants. The job applicants bypass the training system and apply directly for jobs.

The intermediate element, Enrollment, represents the process of selecting trainees from among the pool of applicants. The selection process is based on admission requirements and sometimes on competi-

Figure 2

THE HRDU SYSTEM WITH SUBSYSTEMS AND ELEMENTS


Compulsory
Education
School
Leavers
PIP
Enrolment
Training
Entry
into
Work
EA
PFD
1
2
3
4
Flows of people
Directives
Feedback signals
Flows of information

tion among the applicants. Therefore, the inflow into Enrollment will consist of training applicants who hope to satisfy admission requirements. The outflows from Enrollment are the entrants into Training (those who have successfully passed the admission requirements or won the competition) and those who fail to do so.

The Training subsystem embodies all training delivery mechanisms. There are many different forms of training delivery, e.g. public and private training, initial and further training, retraining, youth and adult training, training provided in institutions and enterprises, on-the-job and off-the-job training, and formal and informal apprenticeship. The inflow into the training subsystems consists of those training applicants who successfully pass the enrollment selection mechanisms. The training subsystem has two outflows: graduates who successfully complete their training and those who fail to do so, the dropouts.

The other intermediate element, Entry-into-Work, receives the flow of graduates from the training subsystem and also caters to the direct flow of job applicants from the PTP subsystem. The element has two outflows: those who successfully find a job and therefore participate in economic activity, and those who fail to get a job and therefore return to the PTP subsystems.

The Economic Activity (EA) subsystem receives the flow of people who find a job. The subsystem outflow consists of retrenched or retired people or those who enter PTP while still being employed (e.g. those who attend part-time training or evening courses, or are granted paid educational leave).

In order to function effectively, each HRDU system component requires information from the three subsystems. The information from each subsystem is processed through information processing mechanisms. They are represented in Figure 2 by numbers 1 to 4.

Number 1 designates Vocational Guidance and Counselling, whose function is to analyze and disseminate information on employment prospects, skill requirements, working conditions, and training opportunities. It also represents information gathering on the attitudes and aptitudes of a potential training population. Furthermore, Vocational Guidance and Counselling serves the people undergoing training. For instance, it provides advice on alternative training paths and assists the employed in identifying ways to plan their careers. By orienting people's vocational choices, it influences the flows of jobs and training applicants, and thus also the training enrollment process and the process of entering employment.

Number 2 represents the processing of information on Enrollment

Planning. This information directly influences the training enrollment process and, consequently, the training subsystem.

Number 3 represents Training Programming which processes information on industry needs for qualified manpower. As an integral part of the training subsystem, it reviews the training content required and develops training curricula.

Number 4 stands for the mechanism which monitors Labor Market Information. It gathers and disseminates information on employment opportunities, job vacancies and job-seeker mismatches.

The Policy Formulation and Decision-Making Body (PFD) is not necessarily a well-defined and established entity, but it affects total HRDU functioning. Its functions may be dispersed among HRDU system components; they can also be carried out by agencies external to HRDU.

The efficient functioning of the HRDU system depends upon the manner in which various information is collected, processed, disseminated and used. Moreover, policy decisions concerning its goals govern the plans of action of its components.

HRDU policy is complex and consists of a whole hierarchy of policies, which govern the three subsystems and the two intermediate elements. These policies are the potential training population policy, enrollment, training, entry-into-work and human resources utilization policy. They determine the activities of corresponding subsystems or intermediate elements. Figure 3 shows how these policies interact. Obviously, the interaction varies according to a country's sociopolitical and economic environment.

THE HUMAN RESOURCES DEVELOPMENT POLICY

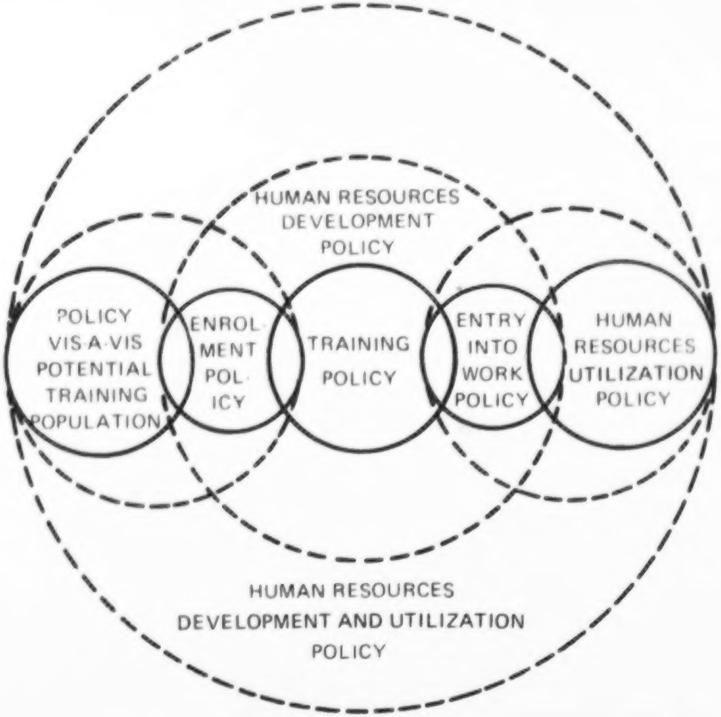
The HRD policy is an integral part of HRDU policy and contains Enrollment, Training and Entry-into-Work policies.

Figure 4 shows how the HRD policy can be disaggregated into lower-level elements. With the help of quantitative and qualitative criteria these elements will be described in terms of their objectives on the one hand, and the means to achieve them on the other. By using these criteria, different national HRD policies can be assessed and possibly compared.

Another purpose of this analysis is to describe how coordinated, well-defined policies can help achieve smooth flows through the HRD

Figure 3

HRD POLICY


HUMAN RESOURCES
DEVELOPMENT
POLICY
POLICY
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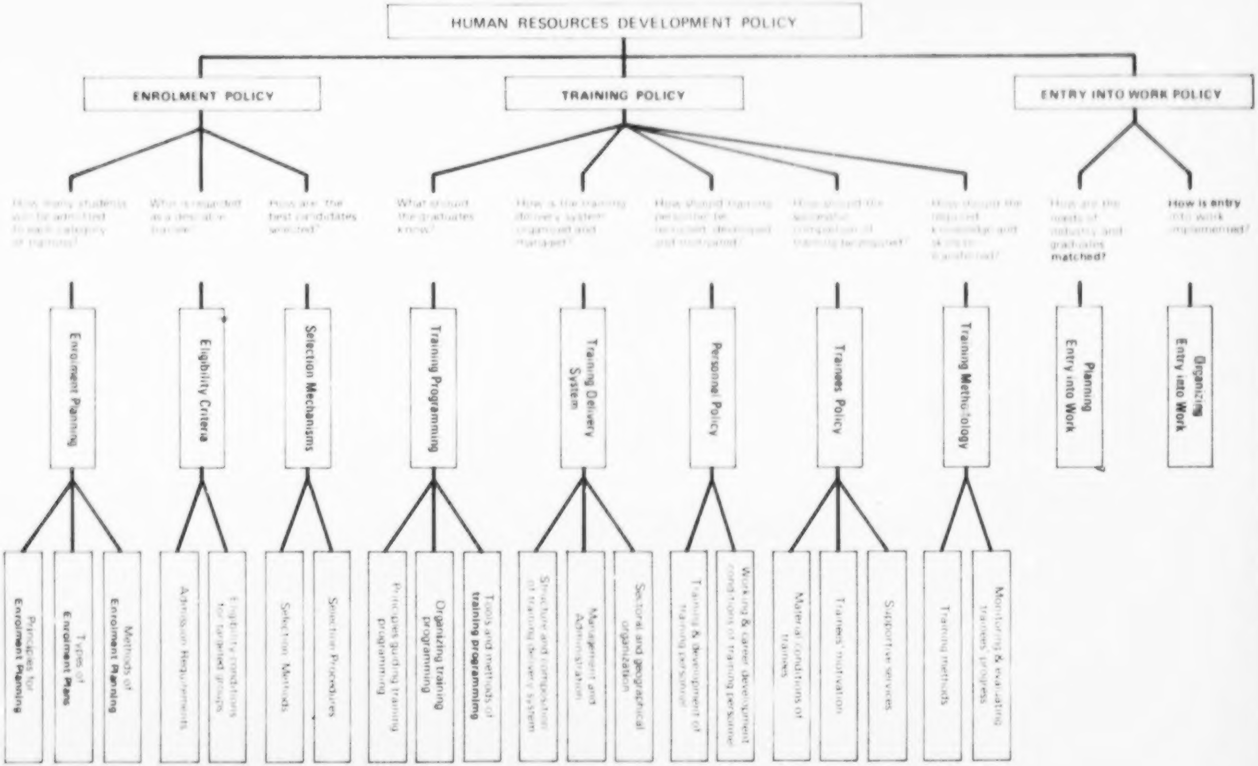
POLICY
ENTRY
INTO
WORK
POLICY
HUMAN
RESOURCES
UTILIZATION
POLICY
HUMAN RESOURCES
DEVELOPMENT AND UTILIZATION
POLICY

Figure 4

HRD POLICY: FACTORS


HUMAN RESOURCES DEVELOPMENT POLICY
ENROLMENT POLICY
TRAINING POLICY
ENTRY INTO WORK POLICY
How many students will be admitted to each category of training?
Who is regarded as a desirable trainee?
How are the best candidates selected?
What should the graduates know?
How is the training delivery system organized and managed?
How should training personnel be recruited, developed and motivated?
How should the successful completion of training be ensured?
How should the required knowledge and skills be transferred?
How are the needs of industry and graduates matched?
How is entry into work implemented?
Enrolment Planning
Eligibility Criteria
Selection Mechanisms
Training Programming
Training Delivery System
Personnel Policy
Trainees Policy
Training Methodology
Planning Entry into Work
Organizing Entry into Work
Principles for Enrolment Planning
Types of Enrolment Plans
Methods of Enrolment Planning
Admission Requirements
Eligibility conditions for targeted groups
Selection Methods
Selection Procedures
Principles guiding training programming
Organizing training programming
Tools and methods of training programming
Structure and composition of training delivery system
Management and Administration
Sectoral and geographical organization
Training & development of training personnel
Working & career development conditions of training personnel
Material conditions of trainees
Trainees' motivation
Supportive services
Training methods
Monitoring & evaluating trainees' progress

system. Each policy will be analyzed through the answers to a set of questions which relate to the specific policy being discussed.

Ideally, the HRD policy has three major objectives:

- to allow and encourage people to develop their capabilities to work in their own best interest and in accordance with their own aspirations;
- to satisfy the economy's needs for qualified human resources; and
- to match workers to jobs corresponding to their training and qualification.

In summary, the HRD policy should facilitate reciprocal relationships among the needs of the worker, the economy and the training system. Its three main components, namely enrollment, training and entry-into-work policies, foster these reciprocal relationships and work conjointly to achieve a regulated, continuous flow from the application stage, through the training period and finally to the entry into working life.

Four factors influence the functioning and structure of an HRD system: the legislation on HRD, the financing of HRD, the participation of government, employers and workers in HRD, and the information on HRD.

HRD Legislation

Most significant decisions concerning HRD are embodied in some legally binding text. The nature and form of such texts depend on the historical, political and cultural background of the country. HRD may be referred to in the Constitution, it may be the subject of a major act of parliament, or it may be described in a Development Plan, which itself has the power of law. Usually, the responsibilities for the different HRD components are spelled out by law, and specific ordinances govern HRD functioning and organization. Often, provisions concerning HRD are included in collective agreements which have legal implications. The identification of the HRD legal framework is a prerequisite for analyzing the conditions under which the specific legal provisions are enforced.

An interesting feature of HRD legislation is how legal acts are realized and how their enforcement is monitored. The degree of flexibility of HRD legislation depends on how often the legal acts are reviewed and updated. Another most important aspect of HRD legislation is the extent to which employers' and workers' organizations are involved in the preparation of HRD legislation and regulations.

The approach proposed is to trace the texts covering HRD and determine their impact on the actual implementation of HRD. A comprehensive review of the relevant legislation may be the starting point for evaluating HRD in a given country.

HRD Financing

The sources of finance for HRD and its distribution are very informative: they show who makes the decisions about HRD funding and what the training priorities are.

In principle, HRD funding may be dispensed from the national, regional or community budget, undertaken by the employers or borne by the trainees. Generally all these parties contribute to HRD funding.

Different forms and categories of training, such as apprenticeship, vocational programs in secondary schools, technical courses, higher education, further education and management development programs, may be financed from different sources by different means.

When funded by the state, HRD has to compete with all other programs which receive government funding. HRD funding, expressed as a percentage of the public budget, would indicate its relative priority in overall public policy. Where the training costs are borne by employers and/or trainees, the total outlays may be assessed as a percentage of payroll, sales revenue or per capita income.

Financing HRD cannot be seen in isolation from the other components of the HRD system, because data on HRD are of varying quality, definitions of aggregates differ cross-nationally and over time, and monetary changes make comparisons difficult. Besides, since HRD policy depends on adequate financing, questions of financial allocation need to be examined alongside a detailed analysis of HRD components.

The Participation of Government, Employers and Workers

The nature and extent of government, worker and employer participation in HRD are important factors to consider. The participation may take place at the legislative stage, when the legal status of HRD is established; at the policy formulation stage, when goals are set; at various planning stages, when priority objectives are determined; during the implementation phase, when training takes place; and during the evaluation phase, when the adequacy of HRD in terms of effectiveness and efficiency is verified in order to make adjustments.

Such participation is built into the structure of HRD and identified in HRD components, mechanisms and procedures. It is often legally defined, stated in the rules governing HRD planning and delivery, or specified in relation to training programs and curriculum development.

The information about participation of the government, employers and workers should be examined when analyzing individual HRD components.

Information on HRD

Adequate and organized information must be available so that the major HRD functions can be implemented. At the policy-making and management levels, comprehensive information is required on HRD system capacity and organization. Planners need information on manpower demand and supply and HRD inputs and outputs. Trainers are dependent upon reference materials to update their programs and curricula. In reviewing the quality and adequacy of HRD information, one should consider the variety and number of information users who require different information products and services. It is important that the information is collected rapidly as data quickly lose their relevance.

So far, the study has examined HRD as a system. It has described the interactions taking place between its components that regulate the flow of people in accordance with social demand and economic requirements. Each major HRD policy area, namely Enrollment, Training and Entry-into-Work, will now be disaggregated into their constituent elements and analyzed.

ENROLLMENT POLICY

Enrollment policy defines the desired flow of entrants to training. In order to be able to define this flow, the following questions (see Figure 4) must be answered:

- How many students will be admitted to each category of training? The answer is provided by enrollment plans.
- Who is regarded as a desirable trainee? The answer is embodied in eligibility criteria defined by policy formulating and decision-making bodies.
- How are the best candidates selected from the applicants' pool? The answer is found in selection mechanisms.

Enrollment policy can be explicitly described through a policy paper, legislation or the like, or it can be an implicit consequence of existing rules and practices which are applied to the enrollment process. Regardless of its form, enrollment policy includes enrollment plans, eligibility criteria (i.e. the conditions that the applicants have to meet) and a selection mechanism by which the applicants are selected.

Enrollment policy is usually formulated at the national or regional level. Private training institutions may have their own enrollment policies. Enrollment policy takes various forms for different types of training, in different sectors for different types of public or private institutions.

The way enrollment policy is dealt with at this broad level can give an indication of the importance given to certain social and economic HRD objectives. For example, some objectives include equal opportunity for all applicants or place accent on rural economic development.

Enrollment Planning

Enrollment plans are critical elements of an enrollment policy since they usually determine the number of training places in each category of training. The nature and type of an enrollment plan depend upon certain enrollment planning principles, local, regional/state or national levels, time perspectives and different techniques and methods that can be used in policy planning. To develop each type, a variety of methods is available. Enrollment plans often suggest a country's priorities with regard to who should be trained and what economic sector should receive priority attention in terms of human resources.

Eligibility Criteria

Eligibility criteria work like a filtering mechanism determining who may be admitted to training. In some cases they are defined by some form of legislation. Eligibility criteria may consist of minimal, basic requirements or they may be very specific, numerous and deterministic. Those that impose no conditions regarding a person's health, age, financial state, educational background, etc. lead to virtually "open admission". On the other hand, specific eligibility criteria demanding satisfaction of many conditions, mean a "restrictive admission". When the number of applicants exceeds the number of training places which cannot be expanded, additional criteria could be introduced to reduce the number of eligible applicants or to identify the potentially most successful trainees among all the applicants.

Special training schemes geared to the unique needs of certain identified groups, usually have distinct eligibility criteria which reflect the particular characteristics of the targeted group. Applicants who meet such criteria and can demonstrate special needs, may then receive priority treatment and special attention in training.

Selection Mechanism

The aim of the selection mechanism is to select the best from those applicants who meet the admission requirements or to classify them according to their knowledge and abilities. Selection mechanisms depend on what methods are used and how the selection is organized and implemented. They may be officially established, or organized ad hoc. There also may be different conditions in the selection of trainees from training authorities and employers' and workers' organizations.

TRAINING POLICY

Training policy is an integral part of HRD policy and is closely linked to enrollment policy. It has two equally important objectives: to produce effectively and efficiently the desired flow of qualified graduates and to provide trainees with knowledge and skills needed to understand and influence the working environment. Accordingly, it consists of several sub-policies which determine directions, priorities and methods of training.

These policies may be regarded as a set of answers to the following questions:

- What should the graduate know?
  The answer is given by training programming which defines the scope and level of knowledge and skills expected to be achieved by the enrolled trainees at the completion of their training.
- How is the training delivery system managed?
  The answer is contained in a description of the structure, organization and management of the training delivery system.
- How should training personnel be recruited, developed and motivated?
  The answer deals with issues of personnel policy.
- How should the successful completion of training be ensured?
  The answer concerns conditions affecting trainees and their performance, i.e. trainees policy.

- How should the required knowledge and skills be transferred? The answer determines the methodology of training.

Training Programming

Training programming defines the level of knowledge and skills the graduates should achieve in order to be productively integrated into work. In other words, it translates manpower requirements into types and levels of knowledge and skills. How training programming is organized differs from country to country; it is either implemented on a national level by government regulatory bodies or a local level by, for instance, a training institution. Its implementation may involve representatives from industry, professional associations and trade unions.

Methods of training programming should be appropriate to national conditions, its socioeconomic and political structures, cultural environment, the labor market, industrial relations, etc. As a result of training programming, curricula and syllabi may be developed.

Occupational and training classifications or trade standards are useful tools for training programming.

Training Delivery System

A training delivery system embraces all of the training capacity of a country, training institutions as well as training resources available in the enterprises. Generally, the system is highly heterogeneous, including independent public and private institutions reporting to various educational and training authorities. It provides initial and further training to young people and adults in all sectors and at all levels of occupations.

An important characteristic of a training delivery system is its structure, which can be analyzed from different points of view: the types of vocational education and training, the perspective of its administration and management, or its sectoral and geographical comprehensiveness. The effectiveness of the system largely depends on how its structure corresponds to the goals of an established HRD policy.

Personnel Policy

Effectiveness and efficiency of training in a country depends to a great extent on the availability and quality of training staff and its motivation. So training personnel policy should pursue two major objectives. The first is to ensure that adequate numbers of staff with necessary qualifications are available to satisfy the needs of the training system. The second is to motivate personnel not only to perform in the best possible way under given circumstances, but also to further improve its performance. The training staff includes instructors as well as others responsible for the planning, management, administration, organization and evaluation of training.

Thus a trainer training policy can be regarded as a component of a training personnel policy. Training of trainers follow the same rules as training in general and includes important components like planning, programming, delivery systems and management. In a broader sense, trainer development policy should also include such major components as enrollment policy and entry-into-work policy for trainers.

The policy framework with regard to trainers will be studied more thoroughly at a later stage.

Trainees Policy

The objectives of trainees policy is to ensure successful completion of training by the enrolled student. This requires adequate material conditions, adequate trainee motivation and adequate support services. In many cases there exists a special body within training administration responsible for implementing trainees policy.

Training Methodology

Training methodology is a composite term which refers to the approaches adopted to impart knowledge and skills. Training methodology covers designing, implementing and evaluating theoretical and practical training activities in the classroom and workshop. It also includes preparing, using and evaluating the training materials required.

The training methodology must be adapted to trainees' characteristics and needs, training objectives and material conditions of the training process. It should also take into account the environment in which training activities take place. A special body responsible for research and development in training methodology exists in many countries.

ENTRY-INTO-WORK POLICY

A major objective of entry-into-work policy is to provide graduates access to jobs which correspond to their skills. Another objective is to ease the integration of graduates into working life.

The entry-into-work policy is defined by answers to the following questions:

- How are the needs of industry and graduates matched?
  The answer lies with planning entry-into-work.
- How is entry-into-work implemented?
  Organizing entry-into-work gives the answer to this question.

For the graduates from initial training, entry-into-work represents their first wage employment or income-generating activity. With unemployed adults who have completed a retraining program, entry-into-work means finding a job or being self-employed. The acquisition of skills does not by itself secure employment. Thus entry-into-work policy defines how graduates obtain access to a gainful activity.

The employment situation for already employed persons who have completed a further training program is different. Their primary concern is to use their new skills in improving their working and financial conditions, with broader responsibility and better career prospects.

Measures contributing to satisfactory entry-into-work may be usefully integrated into a training program. In institution-based initial training programs, trainees may be given the opportunity to work in enterprises to acquaint them with actual working conditions and the working environment. These enterprise contacts facilitate trainees' future integration into work.

Entry-into-work may be organized by public or private placement services or may rely on the graduate's initiative.

Planning Entry-Into-Work

Entry-into-work planning consists of identifying the economy's manpower needs and matching graduates with these needs. The most reliable source of information on manpower needs is the labor market with its information on employment opportunities.

Entry-into-work planning depends on the nature of economic and social planning existing in the country, and more specially on the nature of employment planning.

Organizing Entry-Into-Work

The entry-into-work process may be organized in a variety of ways. There are different rules and procedures which govern this process; there may exist public and private services assisting graduates to find appropriate jobs and helping enterprises to identify suitable graduates. The rules and services vary according to the country's socioeconomic system and level of development.

The entry-into-work may be determined and organized during the enrollment process when enrollment is linked to specific jobs. It may also occur during training, if enterprises are collaborating with training institutions. In most cases, the matching of demand and supply takes place after graduation of the trainee and is regulated by the labor market.

TRAINER TRAINING POLICY

The principles hitherto discussed can be applied to formulate a policy framework for the training of trainers.

Training as a professional activity creates the need that trainers should be prepared in special trainer training institutions or trainer training programs. The trainer training system can be represented by a diagram (Figure 5) which is actually the modified diagram of Figure 2.

(a) Enrollment Policy

In case of a specific occupation such as trainers it is difficult to imagine enrollment planning based on individual demand for training or on social policy objectives.

Most enrollment plans, if they exist, are based on the needs of training systems for training personnel. Such enrollment planning is common in centrally planned economies and also in the industrialized market economies.

While developing trainer training capacities one should bear in mind the phenomenon known as "acceleration". Trainers should be trained before the training for special occupations would start. Therefore, planning of trainer training should be at least one step ahead of conventional training planning.

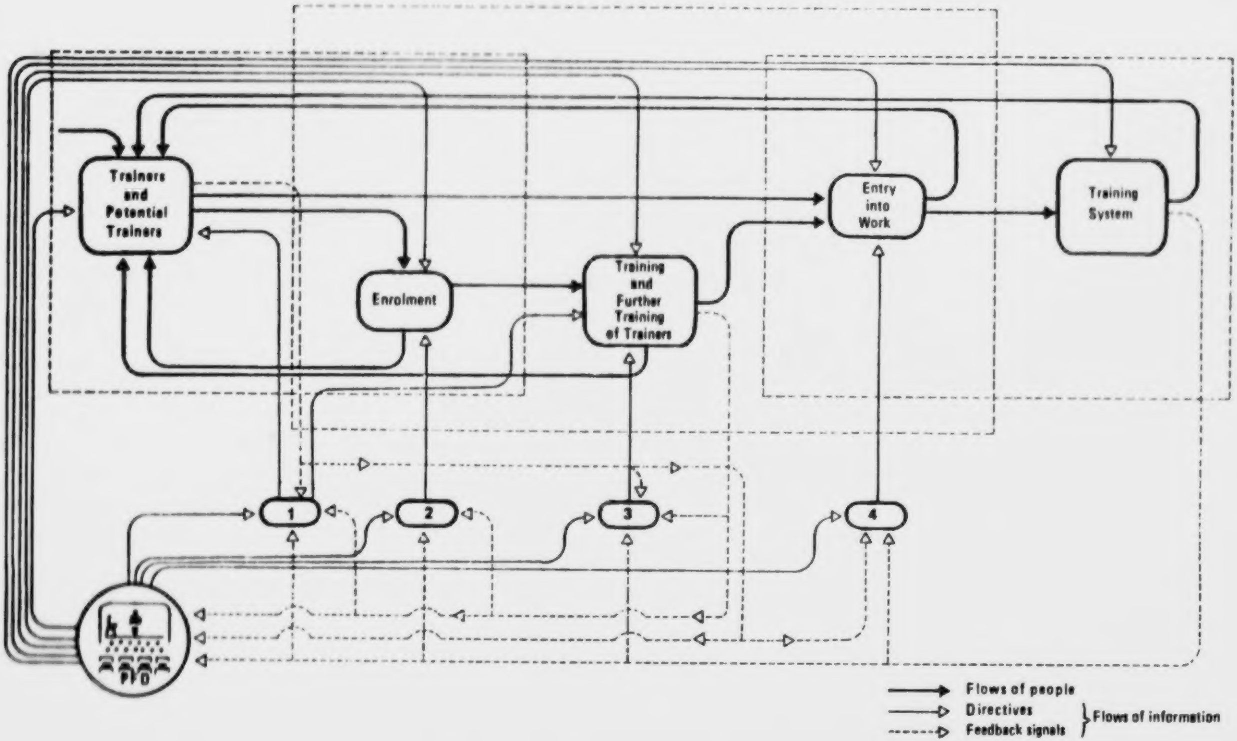
The important characteristics of enrollment planning are the types of enrollment plans and methods used for their development.

Eligibility Criteria

It is widely admitted that graduates of trainer training programs have to meet three general conditions:

Figure 5

TRAINER TRAINING SYSTEM


Trainers and Potential Trainers
Enrolment
Training and Further Training of Trainers
Entry into Work
Training System
1
2
3
4
PVD
Flows of people
Directives
Feedback signals
Flows of information

- they should have technical knowledge and skills which are related to a particular trade or occupation;
- trainers should possess professional, practical experience acquired through work in the trade; and
- they should also have pedagogical qualifications to train students.

These three conditions form the basis for formulating admission requirements. Such requirements may also include norms regarding age, health, mental and physical abilities, and psychological aptitudes.

Experience suggests that professionals – skilled workers, engineers, etc. – after acquiring pedagogical skills become better trainers than general education teachers who become trainers after acquiring professional skills.

Selection Mechanisms

No special selection procedures are needed to select future trainers in comparison with conventional selection procedures.

(b) Training Policy

Training policy consists of training programming, trainer training system, trainees policy, and training methodology.

Training Programming

A training program defines what graduates should know and should be able to do. Training programming is based on principles which implicitly or explicitly state the objectives towards which the training programming should be oriented. These principles provide guidance to the level and scope of trainer training, whether the training should be broad in nature (to prepare the future trainer for a range of possible programs) or whether it should be highly specialized (to meet the requirements of a very specific program).

Training standards indicate the scope and level of skills expected from graduates of training programs. In a sense, training programming could be considered a translation of training standards into: the content and duration of training; the level of performance that is to be attained after training; the facilities and equipment needed; the parts of training provided by institutions and by enterprises; the work experience required; the training methodology to be applied; the monitoring and evaluation of a particular training activity; and finally the certification to be issued on successful completion of training.

Methods of training programming may be formal and well established or developed ad hoc. In any case, their quality plays an important role in developing relevant training policies.

Trainer Training System

An important aspect of the trainer training policy is the trainer training system.

Trainer training may be offered by different types of institutions and programs.

Most frequently it is organized by training centers. But there can also exist training institutions of higher learning, such as the Polytechnic Training Institute in Sverdlovsk (USSR), which gives its graduates higher education both in a chosen occupation and in pedagogy. However the most common form is special trainer training programs which can be offered by training centers as well as by enterprises.

Trainer training may be organized on a sectoral basis to meet the needs of specific sectors. The sectoral organization helps to respond rapidly to changing sectoral requirements. However, sectoral organization may cause duplication of training efforts and therefore underutilization of the training capacity.

The geographical distribution of trainer training programs and institutions should, ideally, ensure equal access to training programs for the applicants from different parts of the country. Public trainer training programs may be under the auspices of a ministerial department. This department would supervise the training activities and control management, and administrative responsibilities may also be dispersed among several ministries as well as local authorities. Even if the training is managed privately, it may still have to report to a national coordinating body.

Trainees Policy

Trainees, who are experienced workers and technicians or teachers, should receive financial support and be provided with satisfactory living conditions during their training.

Upon the successful completion of their study, trainees should be given appropriate rewards for good performance. To motivate students, their progress should be regularly monitored and the monitoring should lead to corrective action.

During their training, trainees will need adequate support services, such as guidance, counselling and medical help, which may increase the rate of successful completion of training.

Training Methodology

Training methods cover techniques and systematic procedures used in carrying out training activities. These may be classified according to different typologies into several major categories. These categories include: (a) group training, when trainees are taught together; (b) individualized training, when each trainee acquires knowledge and skills in accordance with ability, need and personal pace; (c) self-instruction methods, used independently by trainees without direct help from an instructor. According to another typology, training methods may be comprehensive, i.e. covering all aspects of a trade, or modular, i.e. dividing the entire training content into independent units. Specific training methods may take the form of a traditional lecture, a demonstration by the instructor followed by supervised practical work by the trainee, lessons with the use of teaching aids, and case studies to develop the trainee's problem-solving ability.

Training methodologies generally embody mechanisms and procedures to monitor trainees' progress and performance. These have two major objectives. The first is to provide the trainer with information about trainees' difficulties, to help him or her adjust the pace of training, to use other training methods or to take other measures. A trainee also benefits from the test of progress and can identify what additional tuition may be required.

The evaluation may start with pretesting the trainees to check whether they meet the requirements to undertake the training program. This may be followed by monitoring their progress, by comparing the actual with the prescribed level of achievement. A positive final evaluation may lead to a formal recognition of trainees' achievements through appropriate certification.

Analysis of Entry-into-Work policy for trainers is beyond the scope of this paper.

CONCLUSION

General recommendations can hardly be made which would be equally useful for different countries. But the suggested framework may help policymakers, planners and senior officials from government, employers' and workers' organizations, as well as training practitioners to identify trainer training priorities, to analyze trainer training policy and compare it with existing practice.[1]

NOTE

1 Bermant, M., R. Kirszbaum and P. Brandon, "Human Resources Development Policy: A Structured Approach to Its Definition, Analysis and Evaluation", Training Policies Discussion Paper, ILO, Geneva, April 1986.

Training Efficiency

Manish Nandy

This paper addresses the issues of internal and external efficiency of training. It offers definitions of internal and external training efficiency; it states the desired outcomes of internally and externally efficient training; it discusses the prime factors involved in achieving training efficiency; it sets out the main features, then highlights the central principle, of efficient training; finally, it tries to identify the major problems in raising the efficiency of training in developing countries.

Generalized Training Model

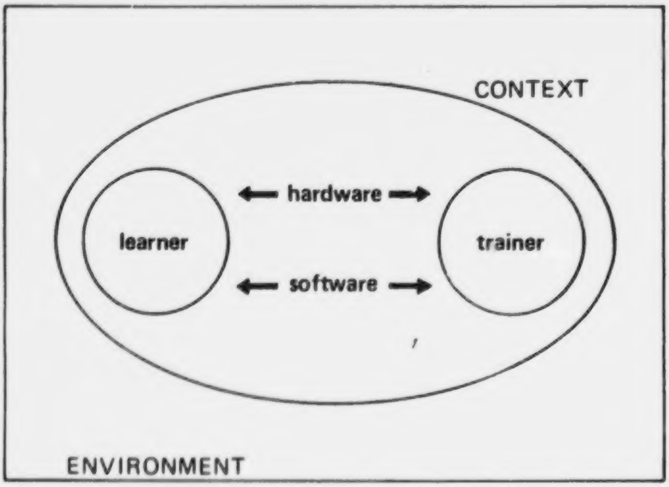
To provide a framework for the ideas that follow, we will begin with a simple, highly generalized training model (Figure 1). It abstracts from the many complexities that are the staple of a trainer's life, which is admittedly a disadvantage; but by doing so it throws into bold relief the fundamental elements of the situation, and that is the crucial advantage being sought here.

The model focuses on the pivotal roles of the learner and trainer. The trainer lectures, helps, provokes, guides, facilitates a process of discovery. The learner listens, asks, challenges and struggles with myriad questions. What takes place between the two is the process of training, but their interaction does not occur in vacuo; it is governed by a structured situation. The two principal components of the structure are hardware, including facilities and equipment, and software, including training design and training materials. In addition, the totality of the structured interaction transpires in a context, normally that of an organization – the organization that often chooses the learner, sometimes pays for the training, and invariably absorbs the learner back in the work situation and determines what part of the recently acquired learning will be applied. Finally, all of this is encapsulated in a particular environment, typically that of a country and its culture and for us that of a developing country.

This is, in essence, the simplified, bare-bones model. Let me clothe it in flesh with a few additional remarks, if only to exhibit some of the practical implications of the model.

First, the model represents the learner and the trainer with circles of equal circumference. It posits an equality between the two, which is quite contrary to the mainstream tradition of training. The trainer knows more about the subject of training than the learner, but the learner knows more about what he wants to know, often what he needs to know and certainly the ways he knows or learns. This is the inner truth of Piaget's wise remark that a mother cannot teach her baby unless she is prepared to learn from the baby at the same time. The current

Figure 1
TRAINING SYSTEM: BASIC MODEL


CONTEXT
hardware
learner
trainer
software
ENVIRONMENT

training practice by and large represents the reverse; all decisions are taken by the trainers according to their convenience, with an occasional token notice taken of the learners' concerns.

Second, the model explicitly focuses on the individual learner. Though training mostly takes place in a collectivity, and group processes significantly affect the learning process, it is more important to emphasize the crucial dynamics of the individual learning process, the way the person sitting in the corner of the classroom is or is not helped by what the trainer does. Too much of training literature talks glibly and casually of a collective unit called "trainees"; that attitude is a barrier to insights.

Third, the interaction between the learner and the trainer takes place within the parameters of a training design. Ideally, the training design should fully define the sphere of interaction, but it rarely does. As a result, the undesigned elements of the sphere, the elements the trainer (or the trainer's sponsor) did not think about, periodically undermine the training process. Let me add that design does not mean structure. The trainer may, for reasons appropriate to the training program, structure parts of the program and leave some other parts unstructured. But the trainer may not leave any part of it undesigned without substantial hazard.

Fourth, the model explicitly acknowledges the place of hardware. It is a curious dichotomy that project officers of international donor agencies are endlessly preoccupied with questions of buildings and equipment, though they well know that these do not a school or training institution make, while respectable trainers, highly knowledgeable in other areas of their work, seen quite disinterested in such questions despite their long-standing impact. In the last ten years, there has been an uncommon proliferation of training hardware, both in number and in variety, but correspondingly, there is now an uncommon degree of ignorance among trainers – at least in the developing countries – about the availability and use of hardware.

Fifth, the model also recognizes what is already a common perception: the role of software. But while software is perceived to have a role in training, the exact nature of that role is far from clear. In particular, two contradictory views are both very popular in developing countries. In one view, most software is imported from western countries and have scant relevance to the training needs of developing nations. Contemptuous allusions to "canned programs" are illustrative of this view. Starkly contrasted is the other view which sees considerable value in using others' expertise as embodied in pre-packaged software. Declarations about the need to avoid reinventing wheels in poorer countries are representative of the second view.

Then the model places the entire training process in a context, that of the organization where the fruits of the process must eventually show up. This is a linkage we still understand very little and accordingly do very little about. But we do know that organizations can significantly influence the efficacy of training by the way they select the learner, prepare the learner, and above all, use the learner on his return to the organization.

Finally, the model encapsulates all these elements in an environment. What does the environment of a developing country do to the training process? What does the relative poverty of skills and resources spell in terms of coping strategies? The model draws our attention to the variable, and encourages us to work out its implications.

INTERNAL EFFICIENCY OF TRAINING

The Concept of Internal Efficiency

By internal efficiency we mean that quality of training which enables it to make the best use of the available resources toward meeting the objectives of the training.

The accent in this definition is on the husbandry of available resources, whether these be learners or trainers, hardware or software. To be efficient is to be able to put these together in the best possible way.

But surely there should be a way to determine whether some training has indeed made the best use of the resources available to its sponsors. The definition suggests that the test is whether there has been some advance toward meeting training objectives. In other words, it distinguishes between fulfillment of the objectives and progress in the direction of their fulfillment.

One way to operationalize the distinction is to take the latter part as tantamount to meeting certain intermediate objectives, which in turn contribute to meeting certain final objectives. In a subsequent section, I will argue that the ability to meet those final objectives is the very hallmark of external efficiency.

So we can now recast the definition of internal training to read: By internal efficiency we mean that quality of training which enables it to make the best use of available resources to meet the intermediate objectives of training.

Intermediate Objectives

What are these intermediate objectives? These are only two: *positive reaction* and *significant learning.*

If the training is successful, the learners will at the end have a positive reaction both to the subject and to the process of learning it. If all learning is self-learning, meaning that learning can only occur by the learner's will, to be able to enlist that will is essential. So training must set about to provide the first ingredient for such enlistment: a link between the subject of training and the "subject" of the whole exercise, the learner. To recognize that the link is vital is also to recognize that it cannot simply be left to the learner to make the linkage. Much of training fails because trainers tend to keep their focus on the first subject, the content with which they are familiar, to the neglect of the second "subject", the learners, who really cannot learn till they can find the missing link between the subject and their life.

The second ingredient that training must provide to enlist the learners' will is an interest in learning itself. The learners may rarely distinguish between their interest in the subject and their interest in the process of learning, except when they say that the subject was dull but the instructor was good (or vice versa); but the trainer must learn to conceptually separate the two and see the value of the latter. If the learners do not like the process of learning, they simply will not learn for any length of time, however drawn they may have been initially by the thrills of the content. Even if they did learn something, it will eventually come to naught, for without a minimal attraction to the learning process what they learned will fail to be updated and rust. Learning and knowing are not sequential events, but parallel processes.

The second intermediate objective is significant learning. This is the more conventionally perceived product of training and occasionally misperceived as its sole product. The learner should learn something of what the training attempts to teach. This is beyond dispute, but the operational question is what represents significant learning. Often training is embarked on without a clear determination of what essential and minimum things the learner must imbibe. If the specific objectives of a training program are set out in advance clearly and behaviorally, it should also be possible to prescribe unambiguously the line of distinction between situations where significant learning can be said to have occurred and situations where it has sadly not occurred.

Factors of Internal Efficiency

Given the present concept of internal efficiency, the factors involved in ensuring it are therefore:

- the learner,
- the trainer,
- the hardware, and
- the software.

Whatever the context and the environment, an internally efficient training program is one where the learner has emerged with a positive reaction to the subject and learning process and some significant learning, where the trainer has worked toward those objectives and achieved them, and where the hardware and software have been well enough chosen and used to contribute to those objectives.

Features of Internally Efficient Training

Internally efficient training has three features: coverage, impact and economy.

A recurrent problem with training programs is in fact their extensive coverage. In the typical instance, someone designs a program and includes all the relevant topics; someone else reviews the program and adds a few more topics considered to have some relevance; and then the persons delivering the program add a few more, which are in their judgment important and incorrectly omitted in the design. For the amateur and the insecure, it is easier to add to programs than to subtract from them, especially as it pleases all and invites no controversy. A far closer, harder examination is needed to achieve internal efficiency in coverage.

In fact, we should start at the opposite end and ask the question: what is the minimum coverage – that is, the minimum array of topics at the minimum level of treatment – that will satisfy the intermediate objective of significant learning? In design, much training aims too high at too broad a target area; in practice, much training consequently achieves too little with too few learners. The key principle of coverage should be carefully examined, only the ones considered quite essential chosen for inclusion, and then thorough modules crafted for each.

The second feature of internally efficient training is impact. Training impact is a function of clarity, connection and appeal. The program content has to be clear and comprehensible to be able to influence successfully the behavior of the learner. The complexity of achieving this increases greatly when in developing countries one has to make a clear choice between training in the local language (or a compromise choice among different local languages) and an acceptable foreign language such as English. The degrees of familiarity with the chosen language may be quite varied among the learners. Connection is the matter of building continuity and flow among the disparate topics chosen for training. The more selective the choice of topics, the more ingenious and strenuous has to be the effort to interconnect them effectively to aid learner reception. Then comes the matter of appeal: the ultimate product has to be "packaged" well enough to attract the indifferent learner and encourage him in the direction of greater application.

The third and last feature of internally efficient training is economy. In a resource-deficient society, the parsimonious use of resources has to be a criterion of efficiency. Moral consideration apart, relative prodigality in the use of resources for one program or module can only end in resource scarcity for another program or module. Discrimination rests in so allocating resources among diverse training efforts that they all achieve acceptable measures of positive reaction and significant learning.

The Central Principle

The central principle of internally efficient training is internalization. The question it would raise about the learners is: Have they "got" it? Naturally, that "getting" cannot be complete or perfect in any sense, but has to be optimal in the specific sense of the learners acquiring some information, understanding some principles or mastering some skills considered critical to the purpose of the training and hence set out in the intermediate objectives.

Let us take a quick look at the significance of the principle for the training of trainers. It is clear, to start with, that the best way for trainers to assimilate the principle is for them to be trained according to the principle. For them to achieve internal efficiency, we must model internally efficient training for them and let them experience its advantages. There is also the well-known multiplier effect: if trainers internalize the principle of internalization, they can pass it effectively on to their learners. This is important, partly because some of the learners may be later in training-type jobs, and many others may be in jobs with training-type components. There are very few supervisory positions, for instance, where the ability to instruct and guide others is not a distinct asset.

Some additional elements come into play when we focus on technical trainers. In the vast majority of cases, technical qualifications are given overwhelming importance in the choice of technical trainers. This is based on the heroic and untested hypothesis that it is easier to make a good trainer out of an engineer than to make a good engineer out of a trainer. This in turn is based on the false assumptions that you need a good engineer to train people in engineering, and that good engineers will be readily attracted to a training career. In developing countries, indifferent engineers with scant commitment to training may therefore be often preferred to committed and competent trainers without an engineering degree. Ideally, of course, the technical trainer should have unimpeachable competencies in both training and the technical subject; but since the ideal is frequently unrealizable, it is critical that we find innovative ways of combining technical and training skills *in a team* rather than rely on the traditional way of seeking a highly unbalanced combination *in a person*.

Also, the concreteness of technical subjects offers a special opportunity to trainers in regard to internalization. First, it affords a singular measure of verifiability in regard to the degree of internalization. It becomes possible to change the variables ever so slightly and see their effect on the learners' level of intake with some accuracy. Second, it makes possible extensive use of well-developed methods of self-guided learning, including the simple and powerful programmed instruction texts and their current sophisticated use in microcomputer tutorials. These provide potent tools for estimating learner needs at succeeding stages, for giving the learner the option of freedom and self-direction, and for judiciously injecting trainer intervention just when it is needed. These prospects represent a rewarding departure from the developing countries' limiting dependence on text-based lectures and pencil-and-paper tests.

Problems in Developing Countries

Given the concept of internal efficiency, it is worth asking what the principal barriers are in the way of achieving it in developing countries. What should be the first steps to strengthen the move toward internally efficient training? We will look at four aspects of the question.

First, the issue of institutionalization. It is a fundamental problem that trainers and training sponsors still pay such scant attention to institutionalizing their activities, even their successful programs. The documentation is often sketchy, invariably incomplete. As a result there is scant accretion of modifications and improvements over time. A program gets to be associated with one or two trainers, and with their departure the program virtually ceases to exist, and a new program comes into its place with the new trainer. With the limited availability of skills, developing countries need to place greater stress on carefully documenting and preserving what exists, so that updating and embellishing can replace the avoidable tasks of reconceptualizing the training every time the trainer changes.

A related issue is the role of the trainer. In developing countries, there seems to be a great demand for charismatic trainers, people with hypnotic eyes and magnetic personalities. Partly this reflects the failure to institutionalize training programs, but partly it also reflects dependence on individual competence as the sole mechanism for securing training results. This is a hazardous strategy and is bound in time to breed problems of discontinuity and tendentiousness. Trainers should increasingly consider team designing and team training to make their collective perceptions and skills add a rich breadth to the training process.

One reason for the heavy dependence on individual trainers and the relative paucity of institutionalization is inadequate appreciation of the uses of software. It is true that often off-the-shelf programs from the US and UK not only cost a lot, but have serious drawbacks when used unmodified in developing countries; it is equally true that multiple reinventions of the wheel are expensive, in terms of both money and time, and there is little wrong in learning from others' experience. In general, in the developing countries there is pathetic dearth of information about available software and hence of informed discrimination between the useful and the plausible. There is great need, through both government agencies and professional societies, for the selective acquisition of organizational and commercial software as well as for the development of locally relevant software perhaps by pooling local talent.

Finally, out of perhaps a painful awareness of budgetary restrictions or an unthinking accent on quantitative achievements, many developing countries are inclined to pack far too many learners in the same training program. The very design of their facilities, particularly classrooms, manifests the inclination. Sadly, this is false economy. Training that is not internally efficient and does not serve the intermediate objectives of positive reaction and significant learning is a gross spillage of resources. The focus ought to be, consistently and uncompromisingly, on the individual learner.

EXTERNAL EFFICIENCY OF TRAINING

This section addresses the probably more difficult issue of external efficiency. Once again, a definition will be suggested, the desired outcomes noted, the main factors and features analyzed, the central principle stated, and lastly the problems in raising external efficiency in developing countries discussed.

The Concept of External Efficiency

By external efficiency we mean that quality of training which enables it to control the training process to best meet the final objectives of the training.

While the intermediate objectives of training may be to help the learner understand some principles or to equip the learner with some skills, the training will be judged eventually by the results it produces in the outside world, such as how well the learner applies those principles in making a product or how competently the learner displays those skills in serving a customer. The latter represents the final objectives, and the degree to which a training program meets these is the measure of its external efficiency.

Final Objectives

Let us take a closer look at these final objectives. These objectives are really two: *behavioral change* and *organizational application*.

The moment we state these final objectives, it becomes clear that they are in a different league from the intermediate objectives discussed earlier. Their fulfillment is far harder to track than positive reaction or significant learning. Learners' reaction are readily gleaned except in a highly authoritarian situation, given some minimum protection of anonymity. Learning is more difficult to track, but not if the learning objectives have been clearly predetermined, through the application of both end-point tests and classroom norms. However, the uncertainties and uncontrollabilities of the outside world make an assessment of external efficiency distinctly more difficult.

Because learners have reacted positively to training and may even have learned from it, it does not mean either that their work behavior will improve or that they will apply their new learning in the organization. Robert Katz argued perceptively in the fifties that for learning to result in changed behavior:

- the learners must have a sense of dissatisfaction about their previous pattern of behavior;
- the learners must see the new behavior as superior and wish to switch to it; and
- the learners must have the help of someone who understands and supports the new behavior;

and that for changed behavior to result in organizational application and possible improvement:

- the learners must have a supportive climate;
- the learners must have the opportunity to apply their ideas; and
- the learners must have the support of others who have interest, skill and clout.

Because of these factors, the effort to track behavioral change is often somewhat complicated. A number of pioneering studies, by organizations such as Bell Telephone, International Harvester, and General Electric, show that such studies are best conducted by seeking the views of not only the learners, but also their superiors, peers and even subordinates. The study is strengthened when alongside the target group a control group is set up for comparative purposes.

The objective of organizational application is susceptible to a somewhat easier assessment. As long as the objectives are stated with reasonable precision, such as the reduction of product defects or the betterment of safety performance, before-and-after measures can be devised to ascertain the external efficiency of training mounted to achieve such objectives.

Factors of External Efficiency

Given the present definition of externally efficient training, and given the factors noted earlier, the factors involved in ensuring external efficiency are:

- the context, and
- the environment.

A training program may be internally efficient and produce both positive reaction and significant learning, but for it to be externally efficient it must first produce changed behavior, behavior that is helpful to the organization and appropriate to the context, and second it must lead to organizational application and show up in some change in the environment. In other words, the context and environment determine what final results emanate from a training program irrespective of its intrinsic merits.

The practical implications of this are not far to seek. The trainers must emerge from their ivory tower and come to grips with the reality of both their organization and their society. However elegant their training design, however well-designed to meet the learners' needs, the acid test of its effectiveness is the extent to which it adapts to the special circumstances of the organization and the developing world in which it operates and produces results.

Features of Externally Efficiency Training

There are three features of externally efficient training: relevance, practicality and criticality.

One cannot determine relevance solely by the traditional method of training needs analysis, that of asking the potential learners where they see their need to learn and improve. Their superiors' judgment also can provide only a part of the information. A large part of the decision has to be based on a careful examination of the organizational work context and the social environment. An appraisal of governmental apprenticeship programs in some countries would show, for example, that the training today is still meeting the needs of organizations yesterday. The organizations have changed, sometimes the societies around them have changed, rendering the relevance of the program somewhat dubious.

The important point then is to look at all the three levels of needs and review the process with great regularity. Earnest trainers who devote immense effort to midwife a program greatly needed at a time naturally develop an attachment to it, often beyond its relevance and legitimate longevity. In a developing country with limited skills and funds, the program then not only reduces external efficiency directly, but also by standing in the way of the emergence of more relevant programs.

Practicality is the second most important feature. Here the important issue is what can be used by the learner within the foreseeable boundaries of his future work. This is not as easy to resolve as it may appear, for often a person's work or occupation may not be clearly delimited, the delimitation may vary from industry to industry, and the training may often be seen as a stepping stone toward further responsibilities of a somewhat different nature.

The practical is often seen as the reverse of the theoretical. This is a pernicious shibboleth. Kut Lewin remarked that "there is nothing more practical than a good theory", and this applies with great force to the business of deciding training content. Practicality does not imply the exclusion of theory, since an incomprehension of the underlying principles can weaken the learner's tenuous grasp of a practice. It only demands that the inclusion of theoretical concepts should be selective and patently bonded with the practical applications.

The other feature of externally efficient training is its criticality. It is critical in the subject it addresses (the learner cannot afford to go without it) and it is critical in its choice of the topics it includes. The trainer simply has to look at the array of relevant and practical topics that can be deservedly included in the program, and then obdurately cast aside all but the most critical. Training, to be worthwhile, has to be a matter of hard choices among attractive options. One is tempted to speculate that the large numbers of people who come to training from the laxer world of education give it the all-embracing aura that it must shed to deliver results in the harder environment of developing countries.

The Central Principle

The central principle of externally efficient training is application. The fundamental question it poses is: Does it "make a difference"? Externally efficient training should make a difference to the organization, perhaps to the profession, and certainly to the nation.

Certainly training cannot even begin to be externally efficient unless it is internally efficient. If learners have not been favorably inclined toward the training and if they have not learned adequately from it, there is little prospect of their retaining the training and applying its lessons. Internal efficiency provides the basis and creates the possibility that the organization and the society which furnish the needed resources will get to see the benefits. But whether that possibility becomes a reality depends on whether the sponsors of the training have explicitly considered the contextual and environmental realities.

The contextual realities are factors like: the support of the management group for training on both philosophical and operational levels, the involvement of key managers in the training activities on a more than superficial level, the general understanding and acceptance of training in the organization, the concreteness of support for training as exemplified in resource allocation through regular budgetary channels rather than spasmodic largess, the readiness of the chief executive to take personal interest and devote personal time, the association of training with the operational priorities of the organization, an active company policy that spells out the place of training in the organizational pantheon, and a conducive organizational culture that often spells the difference between success and disaster.

The environmental factors are even broader and harder to catalogue. They include: the policies and priorities of the economy as a whole, the policies and problems of the subsector to which the organization belongs, public policies that may support some training and even offer incentives, the professional atmospherics of the time, assistance and support possibly available from external, perhaps international, sources, and the general societal culture that values or scoffs at such training ventures.

One can readily see the training of trainers as particularly susceptible to such factors. Because they are trainers and are also undergoing training, they are doubly influenced by the enthusiasm or skepticism that marks an organization or its social environment.

When it comes to technical training, there are two serious problems. First, technical training has somehow come to be viewed as placed at the lower end of the totem pole. It seldom gets the top management attention it merits and is relegated to the management of lower-level staff who are more comfortable with day-to-day decisions than with fundamental issues that alone can lend relevance, practicality and critical impact to technical training.

Second, the comfortable assumption is common that technical training is culture-neutral and hence internal efficiency considerations are paramount in its case. Trainers who have dealt with learners in different countries will testify to the vast differences in learning style even in technical subjects. For technical training to be externally efficient, it must therefore have knowledgeable support from the organization and be linked effectively with the environmental priorities.

Problems in Developing Countries

Given the concept of external efficiency, we again need to ask what the principal barriers are in the way of achieving it in developing countries and what steps we must consider for a move toward externally efficient training. We will look at three aspects of the question.

In several developing countries, training is still too much an act of faith, a process undertaken because it is believed to be salutary, its benefits slowly unfolding over a period of time and hence not quite amenable to hard-nosed computation or analysis. There is therefore still rather limited and gingerly use of the many techniques now available to us of analyzing problems and performance and basing training on the findings. This weakens from the start the linkage between the context that necessitates the training and the training itself. Trainers must be fully convinced of the vital nexus between what the organization or the society needs and what they have to design to serve the learners.

Secondly, in the vast majority of cases, training still seems to rest on a tenuous organizational base. In the public sector it is part of a larger personnel bureaucracy, and in the private sector it continues to play second fiddle to the employee relations function. It is rarely a part of the higher management council and has limited or no access to broader corporate decisions. In agencies where the training outfit is relatively better protected, it also tends to be more seriously insulated. In developing countries, there is a great need to provide a stronger organizational base to training and to bring it into closer linkage with the operational parts of the organization.

Finally, because training is still at the crossroads in the developing countries, still trying to come into its own and fulfil its promise, there is an inescapable need for top management support to bring it to maturity and fruition.

Comparatively, training is a new function; its connection with the operating aspects such as production, finance and marketing are yet to be formalized; its practitioners are by and large managerially inept and organizationally naive; its contributions are occasionally obscure and frequently qualitative; in the corporate or bureaucratic jungle it simply cannot clear the way ahead unaided. It must have a substantial measure of top-level support to achieve its full potential and reach acceptable standards of both internal and external efficiency.

Promotion and Implementation of Technical Cooperation

Rony V. Diaz

The Asian and Pacific Skill Development Programme (APSDEP) was established by the Labor Ministers of Asia and the Pacific to serve as an instrument of intercountry collaboration and coordination in vocational training; to be a forum for the examination and resolution of issues in vocational training common to the countries of the region; to be a vehicle for the collection and dissemination of training materials, information and experience; and to promote greater use of available training resources in Asia and the Pacific.

APSDEP operates through a network of designated focal points in member countries which undertake cooperative actions in research and development, and training. These focal points are national organizations that are responsible for vocational training in their respective countries. APSDEP is guided by a tripartite Policy and Programme Committee that meets annually. The statute of APSDEP is appended at the end of this paper.

TECHNICAL COOPERATION

In addition to the focal points, the APSDEP network includes lead institutions. These are national training institutions that have agreed to undertake some of the technical work of APSDEP, particularly staff training and research, under the guidance of the APSDEP Central Office using the modality of technical cooperation among developing countries (TCDC).

Apart from enhancing self-reliance, the purpose of TCDC are: (a) to provide a way for developing countries to share their resources and experiences with one another with a view to increasing and improving development assistance; (b) to serve as a means of exploring the advantages of regional and interregional development; (c) to be an alternative modality for the formulation and implementation of the governments' development policies, programs and projects.

The General Assembly of the United Nations introduced TCDC into the United Nations system in 1972.

A UNDP-sponsored World Conference on TCDC took place in Buenos Aires in 1978 which resulted in the Buenos Aires Plan of Action and the establishment of an intergovernmental review mechanism on TCDC.

TCDC was further supported by the Asian and Pacific Labor Ministries in their Conference in Tokyo in 1983. Their recommendation was to establish a TCDC fund in order to finance the activities of the regional projects of the ILO, including APSDEP.

The idea of using national Indicative Planning Figures (IPF) to finance a country's participation in the activities of APSDEP was discussed and endorsed by the Policy and Programme Committee of APSDEP in Jakarta in 1984. Each country, it is hoped, in accordance with its needs or its policies, will use the IPF to send participants to APSDEP-sponsored seminars, workshops, training courses, etc.; to sponsor fellows to the lead institutions; to finance the operation of the lead institutions; and to participate in research and development activities.

A model TCDC project document was prepared and circulated to participating countries for their use. India used this model for a TCDC project proposal which is awaiting approval by UNDP to upgrade the equipment and personnel of the lead institutions in Madras and Bangalore, and to finance the training in these institutions of persons from other countries.

APSDEP's activities are implemented according to a rolling six-year plan which includes the work program of the lead institutions. The activities of the lead institutions fall into four broad categories: (1) research and development; (2) group or individual training; (3) consultancy services; and (4) exchange of information. At present, APSDEP has five lead institutions: Advanced Vocational Training Institute in Madras, India; Foremen Training Institute in Bangalore, India; National Industrial Training and Trade Certification Board in Kuala Lumpur, Malaysia; National Manpower and Youth Council in Manila, Philippines; and Fiji National Training Council in Suva, Fiji.

The implementation of work plans of the lead institutions commenced in 1986 with fellowships/study tours for technical personnel to update their expertise in relevant fields. The training programs were organized and financed by Japan which is helping APSDEP promote TCDC.

NETWORKING

Another TCDC mode of APSDEP is networking. Networks develop because institutions decide that problems can be solved more quickly, effectively and economically through cooperative rather than individual action. Information networks are set up to address a range of problems, including loans, cataloging, document delivery, training, provision of factual answers to questions, referral and programs for joint acquisition.

Institutions establishing networks or participating in networks have to identify their needs which could be met through networking; seek consensus with potential partners; identify objectives jointly with partners; spell out program activities to meet objectives; define rules and guidelines; cost program activities; convince management of the benefits of participation; identify coordinating units; and monitor and evaluate activities.

An information network, based on mutual benefit, can enhance the information resources available to each participating partner.

The information network of APSDEP is called APSDIN. It is composed of national documentation centers and is coordinated by the APSDEP Documentation Centre. The role of the national documentation centers is to provide information materials to the central data base in Islamabad, Pakistan, which in turn provides information products such as accession lists, documentation bulletins, national bibliographies, etc. As the central coordinating agency, the APSDEP Documentation Centre also develops standards and procedures in close consultation with the national documentation centers for the use of the network.

TRAINER TRAINING

Of the five lead institutions established to date, two are devoted to trainer training. The programs of the Advanced Vocational Training Institute in Madras and the Fiji National Training Council in Suva have been suitably organized to meet the trainer training needs of APSDEP member countries. They offer the following programs: skill upgrading, pedagogy and administration. The duration of the instructor programs varies from two weeks to one year. Where necessary, programs can be tailor-made to suit the client.

These lead institutions were selected on the basis of their demonstrated competence in trainer training, their willingness to accept trainees from other countries, their accessibility in terms of location, language, and method of training, and their compatibility with the sociocultural environment of their subregions.

Under this arrangement it is expected that the cost of training will be shared between the sending and receiving countries. The sending country is normally expected to meet the cost of international travel. The lead institution is expected to meet all or some of the local costs, tuition, books, accommodation, meals and pocket allowance. TCDC in trainer training also provides for the exchange of experts between institutions.

Through APSDIN, training materials and current information on trainer training can be provided systematically to national institutions undertaking trainer training.

THE ROLE OF APSDEP

APSDEP acts as a clearinghouse and provides a linkage between the sending and receiving countries. APSDEP expects member countries to identify their own training needs and decide which components may be met through TCDC. Such a need is then conveyed to APSDEP which makes the necessary arrangements to suit individual, institutional or national needs.

Statute of the Asian and Pacific Skill Development Programme (APSDEP)

I. PREAMBLE

The Asian and Pacific Skill Development Programme (APSDEP) is an instrument of the International Labour Organisation (ILO) and the participating governments, employers' and workers' organizations of the region to foster active regional technical cooperation in vocational training. It was established in response to a request from the Asian and Pacific Labour Ministers.

II. OBJECTIVES AND FUNCTIONS

The overall objective of APSDEP is to promote vocational training, and access to vocational training in all sectors of the economy and at all levels of skill and responsibility, in both formal and non-formal settings, taking into account Convention No. 142 and Recommendation No. 150 concerning Vocational Guidance and Vocational Training in the Development of Human Resources, adopted by the International Conference in June, 1975.

The specific objectives of APSDEP are:

(a) Helping improve the effectiveness of vocational training systems (and the efficiency of training programs) to optimize their contribution to the development aims of participating countries.

(b) Promoting and encouraging the establishment of various forms of technical cooperation among national training agencies, as well as employers' and workers' organizations, to enable them to identify, develop and utilize available vocational training resources in the region.
(c) Exchanging experience, expertise and information on vocational training among and between national agencies, as well as employers' and workers' organizations.

The main functions of APSDEP are:

(a) Facilitating the linking of vocational training agencies and institutions in the region into networks of cooperation and communication in the field of vocational training;
(b) Assisting in the establishment of information and documentation services on vocational training in the region and in the exchange of information worldwide;
(c) Providing opportunities for direct exchange of experience and expertise in vocational training among decision makers of national training agencies and institutions, as well as of employers' and workers' organizations, through advisory services, working groups, technical meetings and study tours;
(d) Creating opportunities for training and development of key personnel of national training agencies and institutions and of employers' and workers' organizations; and
(e) Encouraging, guiding, coordinating and conducting research and developmental work in vocational training and, where appropriate, arranging publication and distribution of the results.

III. STRUCTURE AND MANAGEMENT

Participation in APSDEP's activities is open to countries and territories in the Asia and Pacific region.

APSDEP operates principally through networks of national focal points, designated by participating countries, and through other lead institutions designated by the national focal points. The networks cooperate in research, development and training (see paragraph 19).

As a regional programme within the framework of the ILO, the administration of APSDEP is under the overall responsibility of the Director-General of the International Labour Office (hereafter referred to as the Director-General). APSDEP is headed by a Director (see paragraph 17), appointed by the Director-General in consultation with the participating countries. The Director reports to the Assistant Director-General responsible for ILO activities in Asia and the Pacific (in accordance with the latter's responsibilities as delegated by the Director-General).

A. Policy and Programme Committee

The operations of APSDEP are determined by a Policy and Programme Committee composed of one government representative from each of the countries participating in APSDEP's activities, and four employers' and four workers' organizations in Asia and the Pacific by the Employers' and Workers' Groups of the Governing Body of the ILO.

The ILO is represented in this Committee by an official designated for this purpose by the Director-General.

The Director of APSDEP is the Secretary of the Committee.

The functions of the Committee are to decide on the policies and priorities of APSDEP and on the programme of work it wishes to recommend to the Director-General, to make recommendations on its budget and to monitor and evaluate the implementation, coordination and management of the programme. APSDEP activities will be managed in accordance with a five-year work plan including budget estimates (revised annually) based on the needs of each project in the total programme. The plan will be reviewed at each Policy and Programme Committee meeting.

The Committee, which is convened by the Director-General, shall meet at least once a year, unless otherwise decided. The time and venue of the Committee's meeting shall be determined by the Committee in consultation with the Director-General.

The Director-General may invite other organizations of the United Nations system, regional inter-governmental and other organizations concerned and, as appropriate, governments or institutions from outside Asia and the Pacific to be represented by observers at the meetings of the Committee. In addition, the Committee may propose other observers to be invited with the concurrence of the Director-General.

All decisions and recommendations of the Committee shall be arrived at through consensus. They shall be embodied in the report to be adopted by the Committee at each of its meetings.

The Committee shall adopt its own standing orders.

B. Central Office

The functions of the Central Office are:

(a) to give to the decisions of the Policy and Programme Committee by coordinating a programme of research, development and training, including the provision of advisory services to participating countries, including lead institutions;
(b) to act as a clearing-house for requests for and offers of assistance from national focal points;
(c) to promote the establishment, as required, of additional regional mechanisms for promoting technical cooperation;
(d) to promote and oversee a regional information network on vocational training; and
(e) to serve as the secretariat of the Policy and Programme Committee.

The Central Office shall consist of a nucleus of internationally and locally recruited officials, headed by the Director of APSDEP, appointed by the Director-General and subject to the staff regulations of the ILO.

In addition, the Central Office may be reinforced by internationally recruited advisers serving for periods of time to be determined in relation to the programme of work, or by specialists seconded to the Central Office by national bodies for a specific period of time on conditions agreed upon by the ILO and the national bodies concerned.

C. The APSDEP Network

The functions of the APSDEP networks are to exchange information and to participate in APSDEP's research, development and training activities. The principal network consists of national focal points, and lead and other institutions designated by the national focal points. National focal points shall be encouraged to establish information and documentation services to gather, store and disseminate information and materials for national and regional use. In addition, subsidiary networks programme may be established to implement certain activities in the agreed work programme of APSDEP, under the overall coordination and guidance and with the support of the Central Office. On a voluntary basis, national focal points and/or lead institutions will accept primary responsibility for these activities and will assume the leadership of the corresponding networks.

D. Host Government Obligations

By virtue of the agreement between the Government of Pakistan and the ILO, the Government of Pakistan shall assume the following obligations with respect to the Central Office of APSDEP, which is located in Islamabad:

(a) a yearly contribution of an agreed amount to help defray expenses – such as the salaries of local staff, rent of premises, furniture and equipment and the costs of utilities, maintenance and communications – locally incurred by the Central Office in the discharge of its responsibilities;
(b) payment of this contribution at the beginning of each fiscal year of the Government of Pakistan;
(c) extension to the internationally recruited officials and advisers and to the seconded specialists of the provisions of the Convention on Privileges and Immunities of the U.N. Specialised Agencies as it applies to the ILO.

In the event that the agreement with the Government of Pakistan lapses, the selection of the host country shall be decided by the Director-General after consultation with the participating countries.

IV. LANGUAGES

The working language of APSDEP shall be English. Arrangements may be made, as appropriate, to translate selected documents and materials into other languages within the limits of available resources.

V. FINANCIAL PROVISIONS

The annual income of APSDEP will be held, where appropriate, in ILO/APSDEP accounts and may be derived from any or all of the following sources:

(a) contributions from the regular budget of the ILO as decided by its competent organs;
(b) the contribution of the host country referred to in paragraph 20 (a) above;
(c) voluntary contributions in kind or in convertible currency from other participating governments to the operation of the Central Office;

(d) contributions in kind or in convertible currency from participating governments or governments outside the Asian and Pacific region for the implementation of projects or activities in which they have an interest;

(e) contributions in kind or in local currency from participating governments for the implementation of projects in the contributor's country;

(f) other forms of income including income from APSDEP's publications and services.

In addition, APSDEP may receive contributions and grants from international organizations or programs, national or inter-governmental bodies, individuals, foundations, enterprises or associations for APSDEP activities. Such contributions and grants shall be accepted at the discretion of the Director-General.

The Director of APSDEP shall prepare an annual draft programme of work and a budget in the light of the expected income and expressed priority needs.

The Director of APSDEP shall submit the annual draft programme of work and the budget to the Policy and Program Committee for their consideration and recommendation to the Director-General.

The ILO's Financial Regulations and Rules shall apply to APSDEP's financial transactions.

VI. REPORTS

The Director of APSDEP shall submit an annual report on APSDEP's activities to the Policy and Programme Committee for their approval and subsequent consideration by the Director-General. APSDEP activities shall also be reported to the Asian and Pacific Labour Ministers.

VII. AMENDMENTS

Amendments to this statute may be proposed by the Policy and Programme Committee to the Director-General for his consideration.

Identification of the Principal Needs to Bring About Change

Ray Powell

What follows are ideas and concepts that arose during a Colombo Plan Staff College workshop I attended in early 1986 that challenged my way of thinking about technical teacher education research, development and practice. I hope that, by highlighting some of the more promising practices that are occurring worldwide, we can identify some of the principal changes that need to be brought about in the way we deliver technical teacher education in the Asian and Pacific region.

Technical teacher education is a lifelong process. There is a great need within the region to think about teacher education across the entire professional continuum of preservice, induction and in-service instruction. Unfortunately, the current view of teacher education limits it to the experiences and training that are gained within the confines of a set course of instruction, administered usually before a person has begun to teach or in conjunction with the first few months of teaching. This view of teacher education is driven by the way preservice teacher education is typically organized; it has been and continues to be the responsibility of colleges and departments of education and specialized institutes.

TEACHER'S POINT OF VIEW

Rather than defining it from the point of view of the institutional and organizational arrangements that historically have been used to deliver teacher education, it makes much more sense to define teacher education from the point of view of how teachers experience it.

From the teacher's point of view, teacher education is a career-long continuum of formal and informal experiences. The continuum begins with *preservice or initial* training experiences, followed by *induction* (the first one to three years of teaching) and ends with career-long *in-service* staff development experiences.

Gene Hall of the University of Texas at Austin writes, "Because of the odd way that teacher education has been organized institutionally, that is with colleges being solely responsible for preservice, employers being almost singularly responsible for in-service, and no one being responsible for induction, each teacher has been left with the challenge of making sense out of his or her own portfolio of disconnected teacher education experiences."

For teacher education to be more effective, teacher educators have to think of ways to interconnect the varied experiences teachers participate in as their careers develop. Thinking of teacher education as occurring across the professional continuum will help. The challenge for us is to stop thinking of which institution does what, and think more in terms of how it is perceived and used by teachers.

AGREED EXPECTATIONS

We need to come to an agreement on our expectations for "beginning teachers". Another need to bring about change is for us to rethink our expectations for teachers upon completion of their preservice or initial teacher education phase. To illustrate the contrasting expectations for preservice teacher education, Hall cites the four very different images of beginning teachers commonly held. These are: the ready-made teacher, the teacher missionary, the professional teacher, and the inductee teacher.

All that is needed for teachers to enter the profession, some believe, is to have advanced training in the technical area they will be teaching. This is the image of the *ready-made teacher*. It is argued that there is nothing to learn in terms of pedagogy, adolescent development, or the effect of social and economic factors on the learning process. Advocates of this expectation believe that whatever teachers need to know about how to teach can be picked up after they begin teaching. From this point of view, the graduate leaves his technical training institute and is "ready-made" to be a teacher.

People expressing the expectation of the teacher missionary argue that the purpose of preservice teacher education is to prepare missionaries – teachers who will go forward and sweep away the backward practices that are found in the classrooms. Quite often these protagonists of teacher education as training for missionaries are living out their own frustrations with teaching through the people they have been given the responsibility to train. The expectation is that beginning teachers can bring about significant changes in the long-established practices of their more senior teacher colleagues.

Implicit in many other discussions is the expectation that the preservice teacher education program should prepare teachers for any circumstances that they may ever meet and, further, that their preservice training would ready them for career-long responsibilities as teachers. This is the expectation of the initial or beginning teacher as the *professional teacher*. Supposedly, no further training or updating is needed. Unfortunately, this position is held by many higher education-based teacher educators. In fact, it sometimes goes further; the beginning teacher is expected to be even better than the experienced or long-serving teacher and entrusted with the most difficult classes with often the most difficult students.

Finally, there is the expectation of the beginning teacher as the *inductee teacher*. This is the expectation which appears to be the most reasonable of the four, and is the one toward which teacher educators ought to be moving. The primary responsibility of preservice teacher education, from this perspective, is to prepare aspiring teachers to be ready to enter the induction phase of their careers. The primary goal of the preservice experience is to equip future teachers with enough basic skills and confidence so that they can do more than just survive their first year in teaching.

Thus we have four very different images of the graduates of preservice programs. Perhaps, if teacher educators can agree on a set of reasonable expectations of the preservice program in the future, they can offer more appropriate types of activities at different points across the professional continuum, rather than trying to do it all in preservice exposure. Teacher education can become more relevant.

RELEVANT RESEARCH

Another need which must be addressed urgently if change and improvement is to be brought about in technical teacher education is that of dramatically increasing the amount of research that is undertaken on *teacher education*. It is important to distinguish between research on teaching and research on teacher education. Research on teaching refers to the increasing body of knowledge that has accumulated in relation to the actions and effects of teachers in classrooms. Research on teacher education, on the other hand, deals with the process and content of efforts to teach teachers to teach. In teacher education research, the focus of study is upon identifying strategies, procedures and outcomes of teacher education. Of course, a part of the knowledge base that can be brought to the study of teacher education is the result of research on teaching. But research on teacher education is more; it must provide guidance to and inform the design of teacher education programs, examine the role and function of teacher educators, and identify the types of knowledge base that teachers need, including the knowledge of a subject matter. In addition, it must tell us more about the training of teacher educators.

Knowledge of subject matter is obviously a skill which is required by teachers. Research on teacher education, however, might begin to answer the debate as to *how much* depth of knowledge is necessary to be a successful and effective teacher. It is clear that a minimum of subject knowledge is essential. However, it is not clear that continuing to take more advanced courses in subject fields that go way beyond the level and detail that teachers will subsequently be introducing to their students necessarily results in teachers being more effective. In fact, in some countries, teachers' continued attendance at upgrading programs under the sponsorship of their governments is a device for improving their careers rather than their performance.

Once the minimum threshold of subject knowledge has been reached, it can be argued that greater student achievement will result if the teacher in training takes more coursework in *effective ways of teaching, preparation of teaching materials, and the effective management of curricula, students and the teaching act.* These pedagogical skills cannot be achieved by reading the literature. They require training, coaching, practice and modelling, just as with the development of other types of skills. This is where research on teacher education may offer us some promising solutions.

One of the sets of competencies that teachers need to develop is to be able to view their teaching with a holistic perspective. This entails looking across a reasonably prolonged period and examining the overall design of their teaching patterns. This is particularly necessary, given what we know about adult learning styles. How do the various lectures, materials, concepts, discussions, laboratory/workshop work and mediated activities fit together to represent an overall teaching strategy? There are differences in skill and effectiveness in teachers' use of different teaching strategies. Certain plans and designs of lectures can be associated with higher levels of student attention and greater student achievement.

Systematic analyses of the role of the teacher in the teaching act have provided many new details about teaching behaviors that make a difference. There have been systematic studies to identify the ways that more effective teachers work and to contrast more effective teachers with less effective teachers. These have led to the identification of an array of specific skills that more effective teachers use, or use in different proportions or in different ways, than less effective teachers. This has been the main contribution of classroom researchers over the last decade, but more needs to be done.

Another very promising area of research is that of *classroom management*. The Research and Development Centre for Teacher Education at the University of Texas at Austin focused on differences in the ways more effective teachers organized and managed their classrooms contrasted with less effective teachers. They found some systematic differences, such as that the more effective teachers tend to establish rules and procedures within the classroom far more quickly than their less effective colleagues, who tend to do so only when problems arise.

TECHNOLOGY

As technology becomes increasingly available to teachers, questions are being raised with regard to the best use of technology. Countries differ in their range of access to technological resources. It is clear that these can be valuable tools for teaching and learning. Therefore, we must ensure that, as soon as possible, teacher educators are seen to be modelling the diverse ways that the new instructional resources can be used. We need to help our teachers develop learning skills so that, as new and more creative uses of technology appear, teachers can effectively draw them into the training of future students.

Hall has raised the issue of the origins of teachers in technical education and pointed out that, in the United States, tracing the origins of teachers and teacher educators has produced a valuable dimension in understanding and implementing the change process. It was found that American teachers were predominantly Caucasian and female, and came from middle to lower middle socioeconomic strata. Teaching was seen there as a status profession, particularly for women. But more recently, there have been significant shifts in the status of teachers and teaching, as well as in the economics and workplace conditions for teachers. These, in combination with the increased opportunities for bright white females to move into other careers, has exacerbated a teacher shortage.

In the Asian and Pacific region, there has been a chronic shortage of technical teachers, with the average institution having 40 per cent of its teaching positions unfilled. There is a need to understand where the bulk of our technical teachers come from.

How is teacher education done? If change is to be brought about, the process and content of teacher education needs to be focused on too. There is considerable emphasis upon use of more and more exotic forms of technology, the use of the media, the importance of not lecturing well, the importance of having alternative enabling activities, instructional modules, pretest/posttest procedures, etc. Yet, in most developing countries, most teacher education is still done in college-based classrooms with the teacher educator lecturing or leading a discussion session. The linkages between practice in the field and in clinical settings are not increasing as fast as many believe.

INDUCTION PHASE

One area that does appear to be more promising has to do with teacher education for the induction phase. There are a number of new strategies and organizational arrangements being developed and experimented with. Induction, that time of transition from the preservice or initial training to being a full-fledged in-service teacher, is critical. Traditionally, it has been referred to as the sink-or-swim stage, and most beginning teachers have been left on their own with little formal training, and in many instances very little informal assistance from their colleagues.

Induction is now receiving greater scrutiny. It is becoming clear that a special set of teacher education experiences are needed to ease the teacher transition from initial training to full responsibility in the classrooms, and a variety of assessment and assistance techniques are being made available for inductee teachers. Further, new organizational arrangements are being experimented with that bring together the teacher educators from the college and university settings along with local administrators and teacher colleagues to form various types of technical assistance and assessment teams which work with beginning teachers.

NEED OF EVALUATION

There is a critical need to evaluate longitudinally the effects of technical teacher education as it has been practised up to now in the region. Until that is done on a systematic basis, it is somewhat premature to talk about the need for change. A wide array of evaluative techniques are available. Some evaluators find it useful to think of these techniques in terms of the domains of learning that are to be assessed, such as Cognitive, Affective and Performance. In all instances, the domains that are identified can be used in pre, post and follow-up evaluation designs. One of the keys in thinking about evaluation is to be sure that the measures used are appropriate to the concepts being assessed. For example, it is not valid to measure teacher behavior through a self-report questionnaire.

The assessment of teacher behavior must utilize some sort of direct observation. None of us can be accurate in describing the proportions of different teaching behaviors we use, or the balance of time that we spend asking open and closed questions. Direct observation is needed to substantiate teaching behavior and other variables of this type. On the other hand, paper/pencil measures can be very reliable for assessing knowledge of subject matter, knowledge of teaching strategies, review of lesson planning procedures, and perhaps even the assessment of attitudes and interests.

One of the great weaknesses in program evaluation and follow-up studies has been the use of low-cost methodologies, even though the evaluation designs required better data collection and analysis techniques. In future evaluations of our teacher education programs, additional resources will be necessary to collect, analyze and report findings.

The issues and needs of technical teacher education in the region are too large and complex for single institutions to take them on. We need a fresh spirit of cooperation and a collaborative effort through the regional institutions that already exist.

PART TWO

DEVELOPING THE SYSTEMS

The Role of Technical/Vocational Teachers as Change Agents

Robert McCaig

The work life of a teacher is from thirty to forty years. If the teacher trainer can imbue the generations of students he trains with the need to critically evaluate their environment and to examine it for needed changes, the impact is immense. Any investment in the teacher trainer who can succeed in producing such a multiplier effect must be cost-effective, irrespective of initial investment costs. This is the first point which needs to be stressed. One needs to have a wider perspective on training costs than the annual budget. Very high initial investment must be seen as amortizing over many years. We apply this principle already to buildings and equipment but regrettably not yet to the major resource, the training personnel.

The second point is that, though there has never been a shortage of talk about creating educational environments for change, this has not been matched by the development of appropriate organizational strategies for its practice. We must therefore be future-oriented, even perhaps with a measure of idealism, since at the present time the opportunities for and the potential of teachers to be change agents in their area of expertise is small. The role they could and should play is considerable. The technicians, using the word in its broadest sense, covering the kinds of services they are able to give, from factory and farm through to partnership with scientists in the most sophisticated of laboratories, can play a key role in innovation and change.

The current impediments to such levels of involvement are culturally and socially determined and, as such, need to be considered with great tact and care. Nations are proud of their culture and traditions which inevitably control human behavior. New nations are particularly proud. The main problem many nations face is the reconciliation of what they would like to be in an economic sense with what sacrifices of traditional and social values they are willing to make in order to achieve economic goals. It could be that social and cultural values can coincide, or be made to coincide, with economic goals. Japan seems to be a happy amalgam of the two. Other nations are "reinterpreting" their traditional values, often very skillfully, to permit rapid technological progress.

Next, one needs to look at the circumstances which engender and encourage change. If we go to the extreme and take creativity as the highest level of change, this being also what most educators mean when they talk about change, then the circumstances leading to this have been well documented. Most of us are familiar with the Silicon Valley type of industry in the United States and with the revolutionary changes which have taken place in the computer industry. The history of the Apple Computer Company is well known and it illustrates particularly well the dangers and the benefits of change.

In that particular culture, the kind of technician industry is seeking for creative tasks is not the kind we would normally employ in a typical Asian organization, and particularly in a government-controlled training institution. As one aspect of the employee's profile, the employer would be looking for evidence of genuine nonconformity – a person who does not fit in easily with the group, who questions and probes and who is not satisfied until he teases out explanations to his own satisfaction. He may not necessarily have high academic qualifications or even social graces. In Asia, he would be regarded as a disruptive element, a bad influence, and a nonproductive employee.

Organizations seeking out such employees must also be different. They have to encourage nonconformity on the part of employees. Adherence to rigid working hours, tidy desks and offices, neat appearance, being good solid members of a team – all are things which would not be sought. It would encourage the employee to daydream, to come and go at will, to argue and debate with other employees. It might encourage teamwork but not with the idea of creating a state of harmony where all push in unison, but a place where people agree to disagree, to clash intellectually, because out of this come the sparks of new ideas.

This is a far cry from the way we train technicians today; it is a far cry from the way I run my own office. It may not even be an attainable or desirable goal in the immediate future, since it can only work in a very particular kind of social climate where trust is strong, where long-term perspectives are necessary, where the taking of risks and hence the making of mistakes is regarded as necessary. The rewards in terms of technological development can be spectacular; the risks and the costs can be equally so.

Because of cultural and political attitudes in the Asian and Pacific region, we are not likely to pay this kind of price or run this kind of risk. Failure is not something which is accepted easily, and it is always a possibility when change is the objective. So far, in some countries in the region, there has been a recognition of the need for such an approach and indeed partial experiments in that direction. Think tanks have been set up with the idea of their being creative, but the area of permitted creativity has been severely restricted – restricted to the discovery of new technological breakthroughs. Whether the creative intellect can be applied sectionally to technological issues while remaining strictly conformist on all other aspects of thinking is an issue which only the test of time will show. I was once asked to explain corporate planning to the faculty of a polytechnic department. Corporate planning is an organizational response to development of change strategies. The department had been asked, maybe even told, to introduce corporate planning. As I explained the elements and the philosophy of corporate planning and the specifications for its success, the faces in my audience became more and more strained. It became clear to them that there was no way for them to undertake corporate planning, since the constraints under which they operated were numerous and the freedoms few. At best, if they arrived at any bright idea, their superiors might consider it. Pseudo-measures to give lip service to change can be disillusioning and destructive of morale. Unless there is genuine belief, it is doubtful if there are benefits to be derived from nominal attempts at it.

I took this extreme case of creativity because the elements in it apply in varying degree at all levels of change and change strategy. Change is not easy or simple. It hurts and threatens people even in a workshop environment. It alters statuses and upsets organizations. It is uncomfortable for most of us. When you talk about change, it must also be in the context of the assessment of risks and of social costs associated with it. Even the smallest changes trigger opposing reactions. Change must never be just for others; as leaders, change must start with us and so current educators must be prepared to draw up their own score sheet outlining what risks and what concessions they are willing to make in order to encourage change.

In the context of tying change to cost, there are areas where technical and vocational teachers can be change agents, given a sympathetic environment and adequate resources. The main resources do not relate to money, but background training that creates appropriate attitudes and values.

One such area, and the key one, is: how to improve industry. The assumption is that industry will be changed by having technicians within the organization as change agents. The technician has both a maintenance and a creative function. This will be possible only if a closer, healthier partnership is established by the training institutions with industry. As the training institution is the service organization, the major initiative must be with it to seek out better ways of working with industry. Educationists associated with technician education have shielded themselves far too long from industry; industry's contribution has been minimal and usually poorly regarded. Educators have a very valid point in requiring of technicians a good conceptual base, an educational component as well as a training component. They too will be the ones to inculcate the attitudes to change that have been referred to. If one is looking at cost-effective training schemes, however, and particularly at long-term economic developments, both educational and training needs need to be addressed cooperatively by educators and industrialists as full partners. Most systems have some links with industry, but many are educationally unsound and, from an industry standpoint, far from effective. Some amount not to training but to the exploitation of the student in cheap, labor-intensive, repetitive situations and hence, from the educator's perspective, a high-cost/low-educational-gain activity. There are several successful models of appropriate cooperation in the region. The Colombo Plan Staff College is publishing a book of case studies describing some of them. A change on the part of educationists to pursue a more aggressive policy for cooperation with industry in developing more integrated education/training programs is perhaps one of the simplest ways of addressing the cost issues associated with long-term effective training. Such positive industry/education/institution environments welcome, and in fact seek out, ideas for change. Without this link, industry will assume more and more responsibility for in-house training with a consequence of formal technician education becoming increasingly irrelevant.

A second broad area goes beyond training in skills and relates to the development of more positive social attitudes and participation in social change. I refer to the key role technicians – and persons at the vocational level – can play in relation with industry in effective environmental management. In the funding of all education, one has to see the long-term perspective rather than the short-term, the wider economic gains rather than cost-per-student-place in a given year. Cost-effectiveness, cost recovery, and economic support can only be seen in this kind of framework. Environmental education is concerned with efficient use of resources, the conservation of resources, elimination of waste, avoidance of the costly mistakes of pollution or abuse of natural resources.

Environmental education must be viewed as an integral part of technician and vocational education, not as an added-on unit in an already overcrowded curriculum. The curriculum has to be rewritten from an environmental perspective. We have to mold both technician teachers and technicians so that their attitude to environment is in-built in the same way that attitudes to cleanliness or other social behaviors are inculcated. Training should be such as to make abuse of the environment an unthinkable action. This applies at all levels. The technician in industry is the person most likely to be at the interface of industrial activity and the environment. He should be the first to be aware, for example, of environmental abuse, such as factory pollution or overuse of chemical fertilizers or the improper maintenance of machinery capable of causing pollution or injury. From the factory laboratories, there is need for training in sensitivity to the environmental factor. Such training can be viewed as an economic or a social saving or a cost recovery factor.

A third issue, and one not unrelated to environmental education, is the need in our training to require quality. One of the factors which hits one most when visiting workshops and laboratories in many countries is the huge waste of human and material resources because of sloppy workmanship. All too often one sees bad maintenance, improper use of tools, inappropriate use of equipment combined with a picture of bored students sitting around in groups without any apparent direction from the teacher who himself does not seem to have any clear objective. Many workshops and classrooms I visit work at well below half of the level of efficiency possible and this constitutes one of the most costly ways of approaching technician education. I was alarmed on a visit to one country, when speaking to a relatively newly appointed principal of an engineering institute, to learn from him that his greatest achievement in the six months of his principalship was to raise attendance level of both teachers and students from a point where less than 50 per cent of either attended in any one day. Since in such an environment the teaching of the 50 per cent present would probably be only 50 per cent efficient, the cost and the waste of resources are considerable. The development of a strong sense of professionalism among teachers or college lecturers so that they become self-motivated to produce the best possible technicians, who will also have a professional attitude to their work, is a cost-saving measure with top priority.

Allied to this is the training of teachers in the use of appropriate technology. Reference is not made here to the kind of technology which is developed to meet the perceived special needs of a developing country – and there is a whole school of thought that wants to look backward rather than forward in this respect – but appropriate in the sense, in the first place, that teachers will use it and, in the second, that they are able and willing to maintain it. The most enduring and appropriate technologies have been the blackboard and the printed page. I have spent a lifetime in education and have seen many cycles of teaching technology particularly in the audiovisual fields. It has been good technology in that it would appear to make learning easier and teaching simpler, but all too often it is unused or put out for display on open days; the teachers just do not use it. Similarly much money has been spent on very elaborate workshops and equipment, with the same story of gross underutilization. Man is fascinated with machines but teachers have to face up to the fact of being prepared to use them effectively and efficiently. A huge saving in time and money can be achieved by being realistic. Donor agencies will see their money better spent if they ensure that the software training component occurs first, with machinery being given only where there is this prior reality.

The problem is easier to solve in retrospect. Currently personal computers look like being very appropriate teaching tools and elsewhere I have supported their utilization; but having seen the fate of a succession of teaching machines which were their predecessors, I wonder what the verdict will be when thousands of these machines will have been installed in classrooms.

Some forecasting on the basis of present and future environments is possible. Recently, I visited a training school in a small town where small-scale fishing and coconut processing seemed to be the major economic activities. The teachers in the school were complaining of the age and worn-out state of their equipment, mainly small lathes. They were old and in need of replacement after many years of hard use. But, standing in the same room was a heavy metal milling machine of comparable age but in unused condition apart from ravages of neglect. Its price in scrap iron alone would replace the lathes. Nobody seemed to have thought of this, even though they were convinced that it would never be used. The point is, however, that at no stage in that town's history would there be use of that kind of heavy machinery: it was obviously inappropriate technology. Lest it be considered that people learn from mistakes of the past, I also visited a marine and fisheries school in the same town. It has yet to take its first students but the white elephants – perhaps one should have white whales in such an environment – were already very apparent. Some donor agencies had contributed huge sums in inappropriate technology. Such costs and lost opportunity costs are a huge drain on educational resources.

Taking the broad field of technical teacher training, it was suggested that the current paper focus on cost-effective training schemes which would cast the technical/vocational teacher in the role of a change agent. Nothing new has been suggested, nothing which would cost more than is currently spent. Nor does the writer have alternative suggestions which would be more cost-effective in achieving the objectives stated. There are alternative structures for carrying out teacher education. Some may be less expensive. There is a popular belief that distance education can be less costly than traditional forms. As in most things, you get what you pay for, and some distance education modes are, as stated in current costs, very cheap indeed. But in terms of producing effective graduates, they are extremely expensive and of doubtful use. The structure is indeed not the prime issue. Cost is not an independent variable; it is relative to what you want to achieve.

I referred to the high investment costs top-flight universities and high-technology firms are willing to pay for creativity. They see this as low in terms of their objectives. Most governments are not prepared to make such high levels of investment – at least in education – nor will they accept high levels of risk. They are conservative forces rather than agents of change. Therefore there will be little new money to bring about the desired objectives if radical new proposals are brought forward. Stress ought to be placed on what is possible within the existing structures and budgets. It would be difficult to justify additional new initiatives when the potential in the existing organizations is so high. The proposals which have been set down are, indeed, not much out of line with what we say we do, but far removed from what actually takes place.

Reference was made earlier to professionalism and to the need for quality. If fixed cost is the overriding factor, then training fewer people but training them better is the preferred way. There are too many Asian countries with too many poorly qualified graduates. They take up too much teacher resource. The teachers of these graduates are usually underqualified in terms of quality of education, often underpaid and generally themselves the product of the kind of education they provide. What money is available should be concentrated on producing leaders of high quality, a small cadre of excellence. Perhaps the most urgent need is for the staff development and retraining of technical teacher trainers, partly in newer pedagogical approaches, but largely in inculcating a sense of professionalism so that the responsibility for ongoing development is accepted by the trainer and extended into developing similar attitudes in the student teacher. With regard to pedagogy, this should be student-centered – on their learning how to learn, on the trainer's learning how to motivate students to learn and to think creatively. Change and the problems of change are human dimensions. Unless there is a grasp of the dynamics of change and an orientation to assuming a role as change agent, the present static state will remain. Hence the staff development should be centered on human behavior techniques.

The well-trained professional person effects subtle but important changes in his environment throughout his working life. We train our doctors, architects, scientists and many other professionals in this way. My impression in the Asian region – but not confined to it – is that we generally fail to do this with teachers. There are other factors with Asian teachers, such as working conditions, which hinder professionalism, but a basic positive attitude to professionalism is not present.

Part of the problem may lie with inadequate support. We have very little data on which educators in the region can rely. Some research has been done in the area of manpower, but little on man. In the Western countries, a lot is known about what motivates their students, what determines their attitude to learning and to the world of work. Do we know anything about Asian students or is there an assumption that the findings of Western researchers are applicable in this region? I do suggest that there is need for research on the attitudes and behavior patterns of our young adults in the region. The issue of how to prepare them better for particular tasks can then be better addressed. The diversion of some funds to the research support units which many ministries have, to collect soft data on students, would seem a desirable step. Much of the data currently generated is statistical and historical, and necessary though some of it might be, it will not help produce the right kind of technician we need for the twenty-first century.

We do not need to look at the twenty-first century to realize what difficulties those planning for technical education face. Technological change is so rapid and becomes dispersed to society so quickly. High technology with its solid state and micro-circuitry, with its in-built telemetric capabilities, with its stress on robotics will possibly be serviced by persons requiring little technical training; the kind of skills and knowledge we now impart will be of little service to high technology industry. Such a state will come about at different times in different nations. At least for the potential technicians now in primary and secondary schools in developing regions, it would be safe to predict an immediate future need of a mixture of low technology, with its requirement of considerable numbers of technicians with high levels of skill, and high technology with a very small number of extremely specialist technicians and a large base of unskilled attendants. Our uncertainty about even ten years from now demonstrates this need for our technical workforce to be able not only to accommodate change, but also to anticipate it and help industry adapt to it. The training systems need the same level of adaptability in both what they offer and how they impart it.

Factors Affecting the Transfer of Knowledge and Skills

Ray Powell

R-2

If there was ever any doubt about the large number of variables affecting individual performance in the learning process, it was put to rest when the American Institute for Research in the Behavioral Sciences produced the following list of differences which all training programs need to address:

- age differences
- sex differences
- differences in abilities
  (a) physical abilities
  (b) intellectual/mental abilities
  (c) other abilities
- differences in cultural background
- differences in family socioeconomic level
- differences in educational background
- differences in needs and desires
- differences in motivation
- differences in attitudes and beliefs
- differences in personality and beliefs
- differences in interests
- differences in aptitudes
- differences in self-concepts
- differences in vocational maturity
- differences in learning styles
- differences in special needs
- intra-individual special needs.

While it might be possible to consider all these aspects of the individual learner, there is no guarantee that such detailed consideration will improve the learner. Because of the time and organization required, it is unlikely that such differences could be accommodated.

An alternative to this relatively uneconomic approach is presented by Benjamin Bloom in *Human Characteristics and School Learning*. While Bloom concedes that the history of the learner must be accommodated if learning is to be efficient and effective, he convincingly argues that there are only two elements of the history that are of critical importance to the learning process:

1. the extent to which the learner has already learned the basic prerequisites for the learning to be accomplished; and
2. the extent to which the learner is, or can be, motivated to engage in the learning process.

Then he adds a third consideration:

3. the extent to which the instruction to be given is appropriate to the learner.

In other words, the three variables are:

- cognitive entry behavior;
- affective entry behavior; and
- the quality of instruction.

To quote Bloom:

> "The central thesis is that variations in the Cognitive Entry Behaviours and Effective Entry Characteristics and the Quality of Instruction will determine the nature of the learning outcomes. These outcomes are the level and type of achievement, the rate of learning and affective characteristics of the learner in relation to the learning task and self."

It must be remembered that Bloom's research was undertaken to establish a framework for individualized mastery learning in general education, and his learners were in fact predominantly primary and high school students. His research findings have been verified in many subsequent longitudinal studies. For example, Payne (1963) demonstrated that arithmetic achievement at Grade 6 could be predicted by arithmetic achievement at Grade 2 with a correlation of approximately +.7, while reading achievement at Grade 5 could be predicted by reading achievement at Grade 2 with a correlation of approximately +.75.

Similarly, Bracht and Hopkins (1972) report that for one sample the correlation between composite achievement tests given at Grade 5 and Grade 11 was +.82. Thus, about two-thirds of the variance of 11th Grade achievement was predictable from 3rd Grade achievement.

There is also an exhaustive study, done in September 1979, entitled *Research Document Into Individual Learning* (McDonald, Melbourne), in which the author recommends:

> "Individual instruction should be implemented in those areas that have the following characteristics:
>
> (i) In those areas that require minimal prior learning or previous learning which most learners already possess;
> (ii) In those subjects which are sequentially based; and
> (iii) In those subjects which emphasize convergent rather than divergent thinking."

If it is conceded that individualized instruction is often a logical outcome of a program based on the concepts of mastery learning, then teacher education programs do not easily fit these criteria.

In the remainder of this paper, I will examine a set of five factors which, from my personal experience in the field of technical teacher preparation programs, have had a large bearing on the success of such programs. The list is not exhaustive and could be argued to be a subset of Bloom's third variable affecting learning performance – that of the quality of instruction.

My list is as follows:

- use of behavioral performance objectives in program design;
- application of adult learning principles and learning systems;
- effective use of instructional materials;
- practice and simulation of desired performance; and
- effective feedback and evaluation of performance.

The order of the items does not indicate relative importance, but rather the sequence of curriculum development. I believe each item is critical to the effective transfer of skills and knowledge, and must be addressed fully in the design and delivery of a technical teacher education program.

USE OF BEHAVIORAL PERFORMANCE OBJECTIVES

The use of behavioral objectives has been for many years the center of an intense educational debate. The debate has revolved around issues such as:

- source of objectives;
- ends to be achieved using objectives; and
- appropriateness of objectives to particular teaching intent.

Major arguments that have been used against the use of behavioral objectives are:

- "Teacher trainers often succeed even though they do not specify their goals in behavioral terms." To this argument Popham responds: "There is obviously a difference between identifying the status and applauding it. Most of us would readily concede that few teachers specify their instructional aims in terms of measurable learner behaviors; but they should."[1]
- "Only trivial learning behaviors can be put into behavioral

terms; the truly important outcomes of education simply cannot be treated that way and will be underemphasized." Popham responds, "The truth is that explicit objectives make it far easier for educators to attend to important instructional outcomes."

- "In certain subject matter areas it is difficult or impossible to formulate behavioral objectives." To this objection Popham replies: "Teachers in the field of art and music often claim that it is next to impossible to identify acceptable works of art in precise terms, but they do it all the time. In instance after instance the art teacher does make a judgement regarding the acceptability of pupil-produced art work. What the teacher is reluctant to do is state such criteria. He must make his judgements. But he is loath to describe them in terms that anyone can see."
- "It is dehumanizing to rely on behavioral objectives because they imply the application of mechanistic measurement procedures to all behavior." Humanistic educators tend to see the trend towards behavioral objectives as a trend toward the reduction of all human activity to small quantifiable pieces of behavior. Popham's reply is as follows: "One is constantly amazed to note the incredible agreement among a group of judges assigned to evaluate the complicated gyrations of skilled springboard divers in the televised reports of national aquatic championships. The possibility of reliably judging something as qualitatively complicated as a springboard dive does suggest that our measurement procedures do not have to be based on a theory of reductionalism."
- "The unanticipated outcomes of instruction are often most important. Teachers will not follow up unique instructional opportunities if they attempt to adhere to pre-specified explicit goals." Gage and Berliner respond to this with the following argument: "Although we advocate pre-specification of goals, we do not pre-specify the means to the goals or exclude from our thinking the unanticipated outcomes and developments of instruction. Many unanticipated events occur in classroom interaction. A teacher should follow up some of these events because they will lead to desirable kinds of learning. But the decisions about what to follow up, and what to spend time on, should be made in the light of the objectives of instruction . . . only a few outcomes of any teaching unit can be specified."[2]
- "Teachers who formulate behavioral objectives and give them to their trainees do not produce greater achievement than teachers who do not." According to research conducted by Duell in 1974 and reported in Gage and Berliner (*op.cit.*), giving the trainees

> behavioral objectives during study results in greater learning, particularly if the objectives direct them to learn information which they would not classify as important or likely to be tested.

My personal summation of the evidence comes down strongly in support of behavioral objectives. However, authors on the subject agree they should meet the following criteria, particularly in occupationally oriented programs:

Performance:	The objectives should state exactly what the learner will be able to do after mastery status is reached.
Conditions:	The objectives should identify any and all circumstances under which the learner will perform the objectives and exhibit mastery.
Criterion:	The objectives should set a minimum standard that the learner must meet to be classified as having reached mastery.

There also appears to be a general support for the use of a "hard" verb to describe the action (that is, "identify", "construct" or "write" as compared to "know", "understand" or "appreciate").

Bloom has gone further by classifying objectives into domains (Cognitive, Psychomotor and Affective) and then breaking these domains into hierarchies. For instance the Cognitive Domain is further broken into Knowledge, Comprehension, Application, Analysis, Synthesis, and so forth in ascending order. However, even many supporters of the use of objectives have difficulty utilizing Bloom's Taxonomy of Objectives.

ADULT LEARNING PRINCIPLES AND LEARNING STYLES

Another important concept in teacher training course design is that of the learning process of the adult. I will briefly introduce some of the principles of "andragogy" (the art and science of helping adults learn) as opposed to "pedagogy" (the art and science of teaching children) as espoused by Malcolm Knowles in the early seventies, and then move on to a brief examination of the work of David Kolb, in particular his delineation of four adult learning styles.

Knowles claims that the differences between "pedagogy" and "andragogy" can be found in the four main assumptions on which andragogy is based.[3]

> *Changes in self-concept*: The assumption is that "as a person grows and matures, his self-concept moves from one of total dependency (as is the reality of the infant) to one of increasing self-directedness". Andragogy assumes that the point at which an individual achieves a self-concept of essential self-direction is the point at which he psychologically becomes an adult. "Thus when he finds himself in a situation in which he is not allowed to be self-directing, he experiences a tension between that situation and his self-concept."
>
> *The role of experience:* The assumption is that, as a person matures, he accumulates an expanding reservoir of experience. In the terminology of andragogy, "there is decreasing emphasis on the transmittal techniques of traditional teaching and increasing emphasis on experiential techniques which tap the experience of the learners and involve them in analyzing their experience". "To a child, experience is something that happens to him; to an adult, his experience is what he is."
>
> *Readiness to learn:* The assumption is that, as an individual matures, his readiness to learn is increasingly the product of development tasks required for the performance of his evolving social and occupational roles. The critical implication is the timing of learning experiences to coincide with the learners' developmental tasks.
>
> *Orientation to learning:* The assumption is that children have a subject-centered orientation to learning, whereas adults have a problem-centered orientation. The critical implication here is that "adults come into an educational activity largely because they are experiencing some difficulty or inadequacy in coping with current life problems".

From these four assumptions, Knowles has developed an andragogical design for learning which comprises the following:

> *Setting a climate* – "I place a great deal of emphasis on creating a climate that is conducive to learning . . ."
>
> *Mutual planning* – "Any person tends to feel committed to any decision or activity to the extent that he feels he has influenced the decision or activity."

> *Diagnosing needs* – "This procedure enables trainees to concentrate their energies on developing those competencies in which they are weakest."

> *Formulating program objectives* – "The students' self-perceived objectives are certainly the starting point, but I believe that I as a teacher have a responsibility to add to the list those objectives that I believe are important and that my institution, the profession, and the larger society identify as being important."

> *Conducting a learning experience* – "The andragogical teacher plans the learning experiences with the students and shares responsibility with them for executing the plans."

> *Evaluating the learning* – "The only valid assessment of learning, especially in professional education, is performance in simulated conditions."

In 1971, Kolb took Knowles' assumptions and developed what he called the Experiential Learning Model.[4] He conceived of adult learners as problem solvers and adult learning as a four-stage cycle. Immediate concrete experience is the basis for observation and reflection. These observations are assimilated into a theory from which new implications for action can be deduced. These implications or hypotheses then serve as guides in acting to create new experiences.

Ideally if the learner is to be effective, he needs four different kinds of abilities: concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (Figure 1).

However, Kolb found during his research that very few adults possess equal ability in utilizing all four abilities. Rather, he discovered that "as a result of our hereditary equipment, our particular past life experience, and the demands of our present environment, most people develop learning styles that emphasize some learning abilities over others". This dominant learning style Kolb labelled as an adult's "preferred learning style".

Thus, Kolb developed his original learning cycle to demonstrate the four "quadrants" into which all adult learners fit, and labelled the four styles *the accommodator*, *the diverger*, *the assimilator*, and *the converger* (Figure 2).

Kolb's work on learning styles has important implications for any program designer concerned with the effectiveness of the learning

Figure 1

LEARNING EXPERIENCES

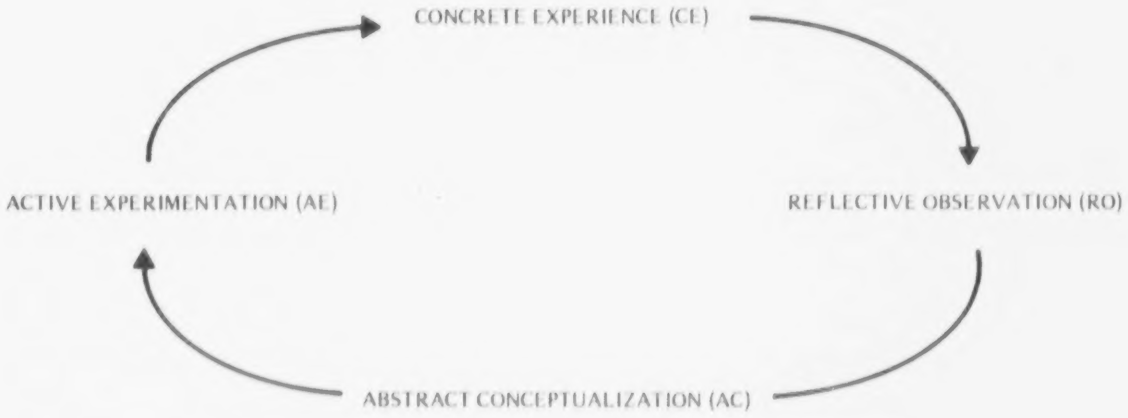
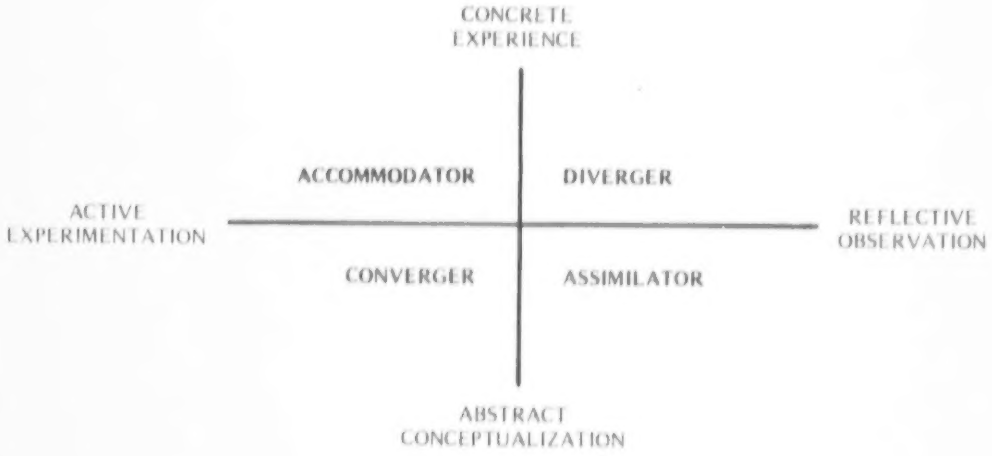

CONCRETE EXPERIENCE (CE)
REFLECTIVE OBSERVATION (RO)
ABSTRACT CONCEPTUALIZATION (AC)
ACTIVE EXPERIMENTATION (AE)

Figure 2

LEARNING STYLES


CONCRETE EXPERIENCE
ACCOMMODATOR
DIVERGER
ACTIVE EXPERIMENTATION
REFLECTIVE OBSERVATION
CONVERGER
ASSIMILATOR
ABSTRACT CONCEPTUALIZATION

process. If we assume adult learning styles to be evenly distributed throughout the adult population, any course design which utilizes only one or two instructional strategies is potentially reducing the effectiveness of the learning process for a large percentage of the course clientele. As an example, I have offered some potential instructional strategies that may be appropriate to each of the four identified learning styles (Figure 3).

EFFECTIVE USE OF INSTRUCTIONAL MATERIALS

Davies writes that audiovisual (AV) materials have the following properties:[5]

- ability to help promote understanding;
- ability to help promote transfer of training;
- ability to provide reinforcement or knowledge of results; and
- ability to help retention.

Davies conducted a broad review of the literature on audiovisual aids and drew a number of important conclusions. From my point of view the most important of these was:

> "The amount they (trainees) learn depends upon the appropriateness of the AV aid to the learning objectives and the structural properties of the task." (*op. cit.*)

In the light of that conclusion, I would like to introduce briefly a decision-making process for media selection developed by Lonigro and Eschenbrenner of the McDonnell Douglas Corporation, USA. Their model provides for certain critical features:

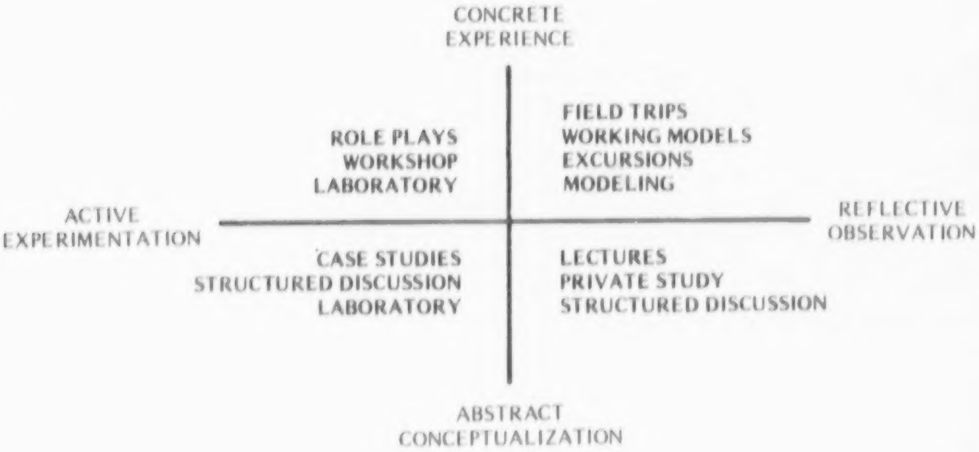
- it proceeds in a systematic fashion;
- it utilizes types of behavior (learning) and degrees of proficiency that are universally applicable;
- it considers a wide range of currently used media;
- it is based on knowledge of known relationship among levels of proficiency, types of learning, and media; and
- it ensures that maximum effectiveness and efficiency are achieved in the learning process.

In this context, effectiveness refers to how well educational goals are met while efficiency describes how judiciously resources are expended in meeting those goals.

Based on previous media selection models, what emerges is the

Figure 3

INSTRUCTIONAL STRATEGIES AND LEARNING STYLES


CONCRETE EXPERIENCE
ROLE PLAYS
WORKSHOP
LABORATORY
FIELD TRIPS
WORKING MODELS
EXCURSIONS
MODELING
ACTIVE EXPERIMENTATION
REFLECTIVE OBSERVATION
CASE STUDIES
STRUCTURED DISCUSSION
LABORATORY
LECTURES
PRIVATE STUDY
STRUCTURED DISCUSSION
ABSTRACT CONCEPTUALIZATION

need for the identification of five factors that must be considered if a media selection process is to be truly comprehensive. They are:

- the types of learning that comprise the job task in question;
- the degree of proficiency required;
- the type of media available;
- the degree of proficiency as a function of various learning type/media matches; and
- the production cost of the applicable media.

Instead of using Bloom's Taxonomy, the developers have produced their own taxonomy of objectives which they call "learning types". These are:

Skilled perceptual motor	–	using simple and complex skills for performing a manipulation task
Learning procedures	–	carrying out a sequence of acts or operations in the proper order
Learning factual information	–	assimilating information which has concrete referents
Learning multiple discriminations	–	knowing how to discriminate among objects, types, words, faults, etc.
Learning principles and concepts	–	knowing and understanding relationships between objects or events.

They then move on to a classification of media into seven categories:

- Print material, still pictures, graphs
- Motion pictures (8mm and 16mm)
- Television
- Tape/slide packages
- Audio recordings
- Programmed instruction (programmed text, programmed packages)
- Simulation (simulators, "live" models, etc.)

Having now categorized objectives (types of learning) and media types, they then move on to the development of a rating scale using three definitions of "proficiency".

High proficiency – indicates the highest probability of the media/learning task being achieved quickly and accurately

Partial proficiency – indicates the probability of the media/learning task being achieved with assistance and is the *minimum acceptable rating in this model*

Low proficiency – denotes an unacceptable choice of media/learning combination.

All of this information can be combined in grid form as in Figure 4. Finally, superimposed over this grid is a production cost factor of High, Medium and Low. This calculation will naturally vary from country to country, so I have made no estimates here. Once these estimates have been made, small graphs can be produced which highlight the total information for each objective (type of learning) as in Figure 5.

PRACTICE AND SIMULATION OF DESIRED PERFORMANCE

The fourth critical area of consideration in the transfer of knowledge or skills is the role of task practice. All teacher training programs attempt to incorporate the concept of putting into practice, within a kind of controlled environment, the theory and principles acquired during the course of the program. Practice as such is being acknowledged as a critical factor within the learning process. The phrase "controlled environment" is meant to denote an environment which has certain distinguishing features such as:

- security to make mistakes;
- approximation to a real-life situation; and
- capacity to provide speedy feedback on performance.

Attempts to create this "controlled environment" with its distinguishing features has resulted in teaching practice programs which range from microteaching practice for a multitude of atomic skills to be learned one at a time, to microteaching practice for a total classroom performance, to various forms of actual college-based teaching practice under the supervision of either a practicing teacher or a teacher educator. In the latter case the teaching practice is either scheduled regularly

Figure 4
MEDIA PROFICIENCY

Types of Learning / Types of Media	Learning Factual Information	Learning Multiple Discriminations	Learning Principles, Concepts and Rules	Learning Procedures	Performing Skilled Perceptual-Motor Acts
Still Pictures/Graphs	PP	HP	PP	PP	LP
Motion Pictures	PP	HP	HP	HP	PP
Television	PP	PP*	HP	PP*	LP*
Simulation	LP	PP	LP	HP	HP
Audio Recordings	PP	LP	LP	PP	LP
Programmed Instruction	PP	PP	PP	HP	LP
Tape/Slide	PP	HP	PP	HP	LP
CAI	PP	LP	PP	LP	LP

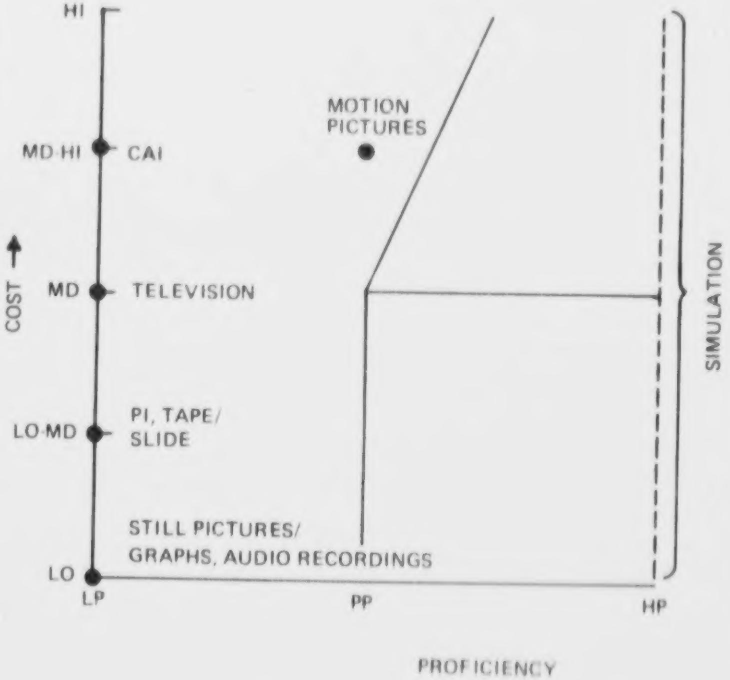
HP = High Proficiency   PP = Partial Proficiency   LP = Low Proficiency

* Differences noted between television and motion pictures occur only when the ability to see fine detail is critical to the attainment of requisite behaviors.

Figure 5

LEARNING OBJECTIVES AND MEDIA

PERFORMING SKILLED PERPETUAL MOTOR ACTS


HI
MD-HI
CAI
MOTION
PICTURES
COST
MD
TELEVISION
SIMULATION
LO-MD
PI, TAPE/
SLIDE
STILL PICTURES/
GRAPHS, AUDIO RECORDINGS
LO
LP
PP
HP
PROFICIENCY

(perhaps week to week within a 12-month program) or in a block usually toward the end of the training program. In some cases there are schemes which incorporate an amalgam of these options.

R. J. Brittan and G. Leith took a group of 56 first-year students in a college of education and randomly assigned some to a control group and others to an experimental group.[6] The 28 assigned to the experimental group carried out a form of microteaching in which all of them took part as pupils in microclasses of four and rated the performance of fellow students acting as teachers. The control group meanwhile were given the normal preparation for practice teaching, which involved advice on lesson preparation, classroom management and classroom observation visits. The researchers found the experimental group significantly superior to the control group, based on two comprehensive evaluation schedules in common usage in appraising trainee teacher performance, and rated by independent and experienced supervisors of teacher trainees, who were totally unaware of the experiment in progress. Remarkably, the same results were achieved two years later in a subsequent evaluation of the same two groups who by this time were already teaching in full-time positions.

I am drawing attention to this study for two important reasons. Given that practice is an important factor affecting the learning process, microteaching offers a relatively cheap yet extremely effective way of improving learning and, in this case, the teaching practice. Though a combined approach of microteaching and on-site teaching practice may be preferable, many developing countries are unable to afford the expense, either in manpower or money.

Secondly, microteaching as a methodology has come in for considerable criticism recently for two rather unfair reasons. It is argued that it trivializes teaching practice by reducing it to a set of simple repetitive tasks; this need not be the case if trainees are focused constantly on a total classroom performance. It is also argued that expensive equipment (for example, video cameras) are essential to providing feedback to trainees. In fact, some of the most effective microteaching I have witnessed has employed relatively simple rating scales mutually devised by trainer and trainee, and administered by the same trainer in a supportive, caring and value-neutral manner.

EFFECTIVE FEEDBACK AND EVALUATION OF PERFORMANCE

The psychological origins of reinforcement models come from studies of animal learning; but when the principles of active responding, small-step size to ensure high probability of success, and immediate application of knowledge as a reinforcing stimulus were applied to the human learning situation, the benefits seemed somewhat equivocal. More recent research is showing that feedback, i.e. the message or compound statement which follows the response made by the learner, should not be regarded solely as a reinforcing stimulus but seen as information which will locate error and tell the trainee how to correct it.

A computer-assisted learning program at Leeds, with children aged ten to eleven years undertaking multiplication practice at the terminal, showed the differential benefits of feedback given in *active* and *passive* forms. With passive feedback, the message was merely printed at the terminal, but in the active form the information was given as a question to which the student had to respond. If his response was incorrect, the correct answer was given and the question repeated. The additional control took longer but was more effective, particularly with pupils of poorer ability (as measured by pretests), and shows the advantage of adapting the feedback to the competence level of the individual learner.

Studies cited by Gage and Berliner (*op. cit.*) also indicate that the knowledge of results can provide an awareness of the need to change.

The teacher may be unaware that certain students are called upon much less than others. Or the teacher may not realize that he does not wait as long for some students to answer as for others. Certain kinds of observational data can bring such behaviors to the teacher's attention. Presented to the teachers in a nonthreatening way, the data create a feeling of the need for change on the part of the teachers.

Flanders in 1970 collected evidence that the mere exposure to an accurate description of one's teaching is enough to develop a strong need for change. In the Flanders system, all teacher and student talk is coded. Sometimes the system is used to record whether narrow or broad questions are asked. Typically, teachers are found to believe that they talk much less than they actually do, and are unaware of a range of other behaviors! When faced with feedback it was shown that many teachers felt a need to change (cited in Gage and Berliner, 1975).

Finally, Davies (*op. cit.*) draws a distinction between "extrinsic" and "intrinsic" feedback. Intrinsic feedback is feedback inherent in the actual task. For example, when an electrician wrongly wires an electrical appliance, he receives immediate feedback from sparks or a strong electrical smell when he tests. Similarly, when a teacher delivers a long, boring lecture, students will lose concentration and start dozing or chattering. Conversely, extrinsic feedback would be exemplified by the teacher actually requesting of his students, "Well, how did I do?"

Davies maintains that extrinsic feedback should emulate the characteristics of intrinsic feedback if the learning process is to be effective.

It should be:

- immediate and not delayed;
- clear, precise and unambiguous; and
- indicative of the correct behavior, procedure or answer.

Davies also lays to rest another "myth", that feedback should highlight the positive aspects of the performance wherever possible. He cites numerous studies to indicate that any feedback, whether positive or negative, *but presented in a nonthreatening manner*, substantially increased the effectiveness of the learning at stake.

In this paper, I have attempted to review the vast amount of research that has been undertaken in the past twenty-odd years on the transfer of knowledge and skills, and selected a set of critical factors which I believe *any* teacher training program must address. Any training program through which a potential teacher passes serves as a model for that person's future behavior as a teacher and facilitator of the learning process. It is also imperative that we, as teacher educators, demonstrate a clear congruency between the research to which we have access and our own practice.

NOTES

1 Popham, W. James et al., *Objectives and Instruction*, A.E.R.A. Monograph 3, Chicago, 1969.

2 Cage, N. L. and David C. Berliner, *Educational Psychology*, Rand McNally, Chicago, 1975.

3 Knowles, Malcolm S., "Self-Directed Inquiry: Innovations in Teaching Styles and Approaches Based Upon Adult Learning", 18th Annual Program Meeting of the Council of Social Work Education, Seattle, January 1971.

4 Kolb, David A., Irwin M. Rubin and James M. McIntyre, *Organizational Psychology: A Book of Readings*, Prentice Hall, New Jersey, 1979.

5 Davies, Ivor K., *Competency-Based Learning: Management, Technology and Design*, McGraw Hill, New York, 1973.

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Cost-Effective National Schemes

Jose D. Lacson

With the growing recognition of the role played by trainers in the development process, the emergence of interest in trainers' development is both timely and appropriate. However, it has also brought to the fore the limitations of current schemes. In many countries, the scheme is characterized by a multiplicity of trainers' training programs conducted by various institutions, leading to duplicated efforts and wasted resources. Ideally all such programs should be lodged with a single entity, but in some countries political reasons make that impractical. Another impediment is the inadequate capability of training institutions to retrain their trainers fast enough to cope with technological change. Trainer training programs in developing countries cannot expand rapidly due to the limited number of available trainers. Some of these shortcomings can be partly traced to the absence of facilities and low level of educational technology.

These issues necessitate a review of current strategies and the adoption of a cost-effective mechanism to provide adequate and relevant training services. Contrary to common belief, the effectiveness of a program does not hinge on the magnitude of resources but on the management of resources. So cost-effectiveness in this context would refer to the best allocation and utilization of resources on programs that help achieve set objectives. This paper will characterize a cost-effective national scheme and suggest strategies that ensure the continuous viability of the scheme. It will then describe some key facilities and program development guidelines to assist program initiators in selecting and designing cost-effective national schemes appropriate to their socioeconomic milieu.

CHARACTERISTICS OF COST-EFFECTIVE SCHEMES

A review of trainer development programs in different countries reveals certain program characteristics that contribute to success or failure.

Adaptive

A survey conducted by the Manpower Services Commission of England in 1975 mentioned that some trainer training institutions were "flourishing with many courses and full numbers in each course, while others were faltering with few courses and low numbers". A closer examination showed that the "popular institutions had adapted and changed over time", while "the unpopular ones had not deviated from the 1965 syllabus and treated the course in an academic and theoretical manner".

These findings point to the necessity of continuously monitoring and evaluating current approaches and catering to the needs of trainers, training institutions and the industry. Inflexibility means ineffectiveness.

Trainers' training has to be based on forward-looking requirements and requires strengthening of research and development activities. Inasmuch as these require large financial resources, cooperation and networking among institutions can reduce duplication of efforts and wastage of resources.

Coordinated

A cost-effective national scheme requires the coordination of efforts of concerned institutions to develop their internal capability with limited resources. A central policy and coordinating body can help.

Strong linkages can be effected through the creation of a tripartite body, composed of workers, industry representatives and trainers, responsible for planning and policy-making. The participants of a 1982 Seminar on Trainer Training in New Delhi, India recommended the creation of a national training council or board by each government. However, the structure could vary to suit the specific needs of the country.

Besides external linkages, coordination within the vocational education system needs to be forged and strengthened. The performance of a trainer depends largely on curricula, training materials, skills standards, and vocational guidance.

Well-Planned

A common characteristic of trainers' training in many countries is its sporadic and uncoordinated nature. Lack of understanding among program planners of the needs of trainers leads to a fragmented and case-to-case approach.

Planning of a national scheme is closely tied with research and development. The latter includes software development, trainer development systems, monitoring and assessment, institutional reforms, creation of an information base, and the assessment of technical capability of trainer training institutions.

Well-Supported

Financial support needs to be accorded to trainer training for proper implementation of planned programs. The Consultative Meeting on Trainers' Training held in Italy in 1982 suggested the appropriation of a major proportion of available funds for training from aid-giving agencies to trainer training because of its multiplier effect.

Since a large financial commitment is required to implement trainer development programs, schemes have to be devised to generate income that will supplement the inadequate budgetary allocation of the national governments. In the case of government institutions, income generated from projects is utilized subject to government rules and procedures and is not necessarily utilized to improve equipment and facilities, upgrade staff compensation and improve services. Although assistance can be sought from developed donor countries, the problem of sustenance is a serious one.

TRAINER DEVELOPMENT FACILITIES

At the macrolevel, schemes for trainers' development aim to provide the skilled manpower required for economic growth of a country. Hence, national schemes can pursue the following specific objectives:

- to allocate human and material resources that will ensure a dynamic approach to trainer development;
- to provide adequate facilities for the development and professionalization of trainers;
- to promote a favorable climate for the effective implementation of trainer development programs;
- to formulate and implement well-designed plans, programs and policies; and
- to stimulate the professional growth of trainers through efficient exchange of information.

This requires effective management of the various elements in trainers' development which are within the control of program administrators. Continuous environmental analysis is required to effect changes in plans of action and prepare for contingency.

Several measures have to be undertaken to address trainers' development:

- *Formulation of plans*: Although it is difficult to formulate a national plan, it is important to provide a clear direction for institutions engaged in trainers' development.
- *Research and development*: Research can provide an important input in the formulation of plans.
- *Monitoring and assessment*: There should be the provision for appraisal of needs of trainers, and the performance of existing institutions. The results can help in revising plans and programs.
- *Staff development*: The teaching and nonteaching staff of training and research institutions should have the opportunity to learn the approaches adopted in other countries and to upgrade their technical skills.
- *Exchange of information*: Provisions have to be made for the exchange of information not only among research and training institutions within countries, but also among trainers themselves. There should be adequate facilities for trainers' training; trainers should have opportunities to attend workshops and conferences; and there should be regular publications on trainer development and "national resource centers".

Specific projects to implement these measures would vary among countries depending on the types and magnitude of existing institutions, availability of resources, and the needs of trainers and training institutes.

ALTERNATIVE APPROACHES

For countries in Asia and the Pacific, an effort should be made to adapt new technologies from institutions in developed countries whenever applicable and relevant to local conditions.

CENTRALIZED NATIONAL INSTITUTE

The Institute shall coordinate the professional development of trainers, curriculum developers and program administrators composing the vocational education community. In addition, trainer training institutions, researchers, and regional and international organizations can have access to the information stored in the Institute. Specifically, the functions of the Institute shall include:

- provide assessment of trainer training requirements at the macro and micro levels;
- develop plans, policies and strategies based on the national priorities;
- conduct seminars, workshops and conferences on provincial, national, regional and international levels;
- provide consultancy services for the improvement of trainers' training;
- establish and install a national accreditation and certification system for trainers;
- undertake research and development activities for improved trainers' development;
- provide technical information services in support of trainers' development;
- coordinate, monitor and regulate trainer training programs conducted by various institutions operating within the country; and
- develop and disseminate instructional materials and aids to end users.

To carry out these functions, the National Institute should have a planning, programming and evaluation unit, a curriculum and training materials development unit, an information center, and a coordinating and monitoring group. Facilities for seminars, conferences, information centers, audiovisuals, reproduction/duplication and laboratories would have to be provided.

In view of cost and time involved in building, equipping and operationalizing such an institute, most countries with budgetary limitations veer away from establishing it as a separate entity. Commonly, it is attached to a research and development institution to strengthen linkages between trainers' development and vocational education. The optimization of human resources and existing facilities support the adoption of this framework. A third option available for countries without a research and development institution is to upgrade the existing facilities of selected vocational training institutions which could serve as National Institutes or their regional centers.

In the United States, a National Academy for Vocational Education was established as an integral part of the National Center for Research in Vocational Education (NCRVE) in response to the increasing demand for training professionals at all levels in vocational education. The National Academy operates an institute and an inresidence program. The institute conducts seminars and conferences for training professionals. Most of these activities are conducted on a cost-recovery basis, with income received from participant registration. The in-residence program is an open-entry/open-exit program which offers an opportunity to national and international participants who intend to pursue an individual professional development plan and use the resources of the National Center and its cooperating agencies such as the Ohio State University.[1]

The Department of Education, Culture and Sports in the Philippines established a National Center for Technician Education and Staff Development (NCTESD) and three Regional Centers for Technical Education and Staff Development (RCTESD) to satisfy regional and national needs for skills and employment creation. To make them cost-effective, these centers are considered as extensions of selected institutions and provided with qualified teachers and local support. The Marikina Institute of Science and Technology has been developed to serve as the NCTESD and extends its functions to include in-service training, research and development, and collaboration between educational institutions and industry. The RCTESD performs basically the same functions as the NCTESD, though its scope is geographically limited. The criteria for selection of the regional centers were accessibility, management and educational standards, faculty qualifications and past experiences in staff development.

In the nonformal sector, the National Manpower and Youth Council (NMYC) established the National Institute for Skills Development (NISD) where facilities for trainers' development are incorporated. The latter's main functional concerns are training systems and models, trade skills and training standards, models and schemes for trainees' recruitment, selection and guidance, training materials development and packaging, direct training services for trainers, trade testing officers, guidance counsellors and training managers, documentation and information, center management, and technical audit and research in training and technology. To carry out its functions of research and development, NISD has the following departments:

- Training Technology Department: designs, develops, produces and distributes training standards, training materials and aids;
- Trainer Development Department: develops and implements programs on trainers' training for people from the industries and government institutions;
- Skills Standards Development Department: develops trade skills standards and tests to ensure quality of training and standard of output;

- Vocational Guidance Department: develops and implements vocational guidance models, systems and instruments;
- National Documentation Center: develops and maintains an information network in support of skills development; and
- Center Management and Technical Audit: evaluates the performance of the Regional Manpower Training Centers (RMTCs) vis-a-vis the training demands in the region.

A holistic approach in improving the quality of skills training is undertaken by NMYC in recognition of the interplay of various functional areas. Regional Trainers' Training Centers are identified in selected regional training centers to expand the coverage and increase the accessibility of trainers' training throughout the country.

NATIONAL RESOURCE CENTER

The National Resource Center (NRC) shall assist trainers to be dynamic and innovative by providing an opportunity for methods development, information search, and applied research. It shall complement other schemes for the development of trainers. Specifically, the NRC should:

- provide facilities and materials for trainers' practice in the local production of training software and sector-related training aids;
- exercise documentation and information control of training materials and sector-related training aids at national, regional and international levels;
- disseminate training information and material relevant to the needs of members of the academic community and practitioners of vocational education;
- establish and maintain information regarding new training techniques and training software development; and
- provide consultancy services regarding new training techniques and training software development.

Services are rendered to program administrators, trainer training and research institutions, and regional and international organizations.

Two alternatives are open to a country planning to establish a NRC. It can be established as a separate entity, as a foundation whose members will be trainers and training institutions. On the other hand, it can be attached to a trainer training institution, vocational education institution or vocational research institution. To increase the accessibility of the services of the NRC, regional centers can be established.

GOVERNING BODY

To address policy issues, a governing body of representatives from institutions needs to be created. This body can offer concrete directions to improve the quality of skills training and to professionalize the trainers.

PROGRAM DEVELOPMENT GUIDELINES

Some guidelines are discussed below to assist program planners:

- Assess trainer development needs: Trainers' technical and pedagogical skills and the technical capability of existing institutions (in terms of the quality and quantity of equipment and facilities) have to be surveyed to determine which institutions need to be strengthened and in what respect. Gaps in the trainer training system would show possible areas of intervention.
- Explore the possibility of using existing facilities before establishing a new one: This is in view of the money and time needed to establish a new facility.
- Develop a national scheme: This requires the use of a systematic planning process with clearly defined goals to identify initial resources, constraints and costs.
- Involve private industry, training institutions and associations of trainers in the planning and policy-making: This is to coordinate and integrate efforts in the vocational education system and to plan adequate and relevant services to trainers.
- Adopt an evolutionary approach to the development of trainers.
- Explore the possibility of adopting income-generating projects: This would lessen the burden on the government to continually support the national scheme.

In short, while it is important to pursue the development of a cost-effective national scheme, the designing of such a scheme is an extensive project that requires coordination among local and international organizations. Networking and technical cooperation among countries are essential for the purpose.

NOTE

1 Nelson, Robert E., *Research and Development Related to Future Trends in the Training of Trainers.*

Job Conditions of Technical and Vocational Trainers

Harry Abrillo

The burden of meeting the high expectations of developing countries from technical and vocational training falls to a great extent on the shoulders of the trainers. Yet the common problem of training institutions is that they cannot seem to attract and maintain the right number and kind of trainers. So it is time to take a look at how the trainers are "treated" in the first place. This is the main concern of this paper. It examines trainers' job conditions in selected countries and their own perceptions, and tries to identify areas for further research.

Methodology

A survey was conducted in five selected countries: India, Indonesia, Malaysia, Singapore and Thailand. Other countries were sent survey questionnaires but not visited. The characteristics of the selected countries are varied enough to make their experiences representative of, and relevant to, many other developing countries.

The survey consisted of two parts. The first was a review of the job conditions of trainers. Information was gathered from published materials and through interviews of staff. The information obtained from interviews may not be very accurate because of several factors, particularly the language problem.

The second part of the survey was conducted through the use of questionnaires (Appendix 1) distributed to the technical and vocational training institutions. The intention was to find out the trainers' own perception of their job and conditions. The survey, however, was not as statistically rigorous as it should have been due to time and cost constraints. The questionnaire was not pretested, the sample size was small and drawn from a few institutions, and no definite sampling procedure was followed. Respondents, particularly in Indonesia and Thailand, encountered difficulty with the English language. This could have affected the accuracy of their responses. One hundred and thirty questionnaires were distributed as follows:

	No.	%
India	22	16.9
Indonesia	22	16.9
Malaysia	21	16.2
Singapore	18	13.8
Thailand	26	20.0
Others*	21	16.2
	130	100.0

*Others include Maldives (3), Papua New Guinea (1), Philippines (5), Sri Lanka (3), Tonga (1), Vanuatu (7) and Western Samoa (1).

To simplify the analysis and comparison, the frequency counts in the various categories were expressed into a single index number for each item. The index number is simply the weighted average of the responses.

The conclusion drawn from this study should be considered, at best, as preliminary and tentative.

THE INSTITUTIONAL SETTING

Among the sample countries, the responsibility for technical training is vested in more than one agency. The reason for this is the apparent consensus among policymakers on the dichotomy between "education" and "training". The task of education (including technical and vocational education) is ordinarily placed under the Ministry of Education while that of training (including technical and vocational training) under the Ministry of Labor. Trainers exist in both agencies and sometimes cross boundaries. But unfortunately a bridge connecting the two camps is more of an exception than the rule.

Job Conditions

The main findings on the trainers' job conditions are summed up in the following tables (Tables 1, 2 and 3).

TRAINERS' PERCEPTIONS

On many aspects of their job the attitudes and perceptions of trainers are not very favorable. This is a common problem in many countries unable to get the right number and kind of trainers.

The majority of the respondents come from the training stream and their profile is indicated in Table 4.

Perceptions: Job/Organization

Trainers were asked to rate their agreement or disagreement, on a five-point scale (Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree), with 15 statements describing the various dimensions of their job. The responses were then tabulated for each statement. The index number for each statement indicates the average level of satisfaction with a particular dimension of the job. The results are shown in Table 5.

Table 1: Employing Authority, Salaries and Allowances

Country	Employing Authority	Employment Status	Monthly Salary Range (US$)[a]	Cost of Living Allowance	Others
India	Central and State Government	Two years probationary period but confirmed only if vacancy exists; tenure guaranteed	110 – 353[b]	Given as % of salary	Residential allowance given depending on rank; part-time work allowed
Indonesia	Central Government	One year probationary period; tenure guaranteed	34 – 123[c]	Given on project basis	Free housing; 10–50 kgs. of rice/mo.; honorarium for in-plant training; OT paid up to Rank III-A; part-time teaching allowed
Malaysia	Central and State Government	One to three years probationary period; tenure guaranteed upon permanent appointment	204 – 946[d]	Given depending on rank (service allowance)	Overtime work paid
Singapore	Central Government	One year probationary period; tenure guaranteed	198 – 1,757[e]	Given depending on rank	13th month pay
Thailand	Central Government	Six months probationary period; tenure guaranteed upon permanent appointment	108 – 371[f]	B 270/month for those receiving less than B 4,800/mo.	Overtime is paid; part-time teaching is allowed

[a] Minimum refers to lowest entry level; maximum figures are not comparable because they correspond to different ranks.
[b] Maximum for Deputy Director for Training.
[c] Maximum for Rank III (B.S. degree holder).
[d] Maximum for B.S. degree holder (DI-Honors).
[e] Maximum for Principal Training Officer.
[f] Maximum for Position Classification 8.

Table 2: Working Time, Leaves and Welfare Scheme

	Work Hours Per Week	Days of Paid leave	Additional Leave	National Holidays
India	42	Fully paid up to 30 days	12 (Casual Leave) 30 (Earned Leave)	16
Indonesia	40	No limit to paid leave	12 (Casual Leave)	14
Malaysia	35	Fully paid up to maximum of 60 days	14	14
Singapore	44	Fully paid for first 30 days and 50% paid for next 30 days	11	12
Thailand	40	Fully paid up to 60 days	10	13

Table 3: Welfare Scheme

India	Provident scheme covering retirement plan, insurance benefits for sick and disabled, and death benefits for survivors; lump sum plus pension upon retirement. No contribution from employees.
Indonesia	Social insurance scheme which covers accident and life insurance as well as savings plan payable upon retirement at age 55. Employee contribution is 2% of salary.
Malaysia	Pension scheme covering retirement benefits such as service pension, service gratuity, disability allowance, derivative pension, derivative gratuity, and dependents' pension. Retirement is compulsory at age 55.
Singapore	Central provident fund which provides benefits such as home protection insurance, lump sum plus continuing income, hospital benefits, investment privileges. Employee contribution of 25% and 10% from employer.
Thailand	Special civil service retirement plan which provides lump sum or monthly payments, disability and death benefits, medical and hospital expenses benefits. No contribution from employees.

Perceptions: Teaching Environment

The quantity and quality of inputs and support elements influence the trainers' attitude toward the job. The respondents were asked to rate the inputs on a 10-point scale, starting with 1 as very poor and 10 as

Table 4: Profile of Respondents

Characteristics		Total	India	Indonesia	Malaysia	Singapore	Thailand	Others
1. Age	130	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
25	8	6.2	4.5	0.0	0.0	16.7	3.8	13.4
26-35	53	40.8	18.2	50.0	14.3	50.0	61.6	47.6
36	69	53.0	77.3	50.0	85.7	33.3	34.6	38.1
2. Sex	130	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Male	112	86.2	95.5	95.5	100.0	50.0	84.6	85.7
Female	18	13.8	4.5	4.5	0.0	50.0	15.4	14.3
3. Civil Status	130	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Married	106	81.5	90.0	100.0	95.2	72.2	82.6	76.2
Single	24	18.5	9.1	0.0	4.8	27.8	17.4	23.8
4. Education	130	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Certificate	56	43.1	36.4	22.8	57.1	33.3	19.2	47.6
Diploma	27	20.8	31.8	13.6	9.6	27.8	26.9	14.3
Bachelors/MS	47	36.1	31.8	63.6	33.3	38.9	53.9	38.1
5. Specialization	130	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Civil	29	22.3	4.5	50.0	23.8	11.1	19.2	23.8

cont. on p. 122

TABLE 4 cont.

Characteristics		Total	India	Indonesia	Malaysia	Singapore	Thailand	Others
Electrical	15	11.5	9.1	9.1	14.3	5.6	15.4	14.3
Electronics	13	10.0	9.1	9.1	14.3	22.2	0.0	9.5
Mechanical	47	36.2	59.1	18.2	28.6	16.7	50.0	38.1
Others	26	20.0	18.2	13.6	19.0	44.4	15.4	14.3
6. Contact Hours	130	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
15	39	30.0	18.2	36.4	47.6	27.8	34.6	14.3
16–25	40	30.8	18.2	40.9	23.8	55.5	19.2	33.3
26	51	39.2	63.6	22.7	28.6	76.7	46.2	52.4
7. Work Experience	130	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
5	19	14.6	13.6	0.0	0.0	16.7	26.9	28.6
6–15	62	47.7	13.6	77.3	47.6	38.9	50.0	57.1
16	49	37.7	72.8	22.7	52.4	44.4	23.1	14.3

Table 5: Summary of Rating on Job Satisfaction

Job Dimension	India	Indonesia	Malaysia	Singapore	Thailand	Others	Average
1. Overall satisfaction	76	85	75	87	74	75	79
2. Opportunity to learn new skills	82	86	77	83	77	79	81
3. Maximize use of skills	83	77	73	82	71	87	79
4. Clear career path	70	68	68	75	68	75	71
5. Not dead-end job	84	71	58	66	62	72	69
6. Clear requirements for promotion	67	72	58	74	72	64	68
7. Friendly interpersonal relations	82	85	78	74	65	85	78
8. Supervisory guidance	72	65	61	80	69	75	70
9. Concern for staff development	68	72	68	81	67	71	71
10. Feedback on performance	86	80	73	80	65	83	78
11. Adequate management support	65	76	65	80	65	67	70
12. Comfortable work area	60	62	71	64	51	61	62
13. Better salaries and benefits	52	67	48	71	51	54	57
14. Security on the job	84	79	75	84	72	75	78
15. Pride in the organization	81	78	75	80	70	78	77
Average	74	75	68	77	67	73	72

Indices, Maximum: 100

excellent. The overall average rating on teaching environment is 64 index points and the details are shown in Table 6.

Perceptions: Salary and Fringe Benefits

Trainers in the sample countries were asked to rate each of twenty items, generally included in the salary and fringe benefits package, on a five-point scale (Very Sufficient, Sufficient, Insufficient, Very Insufficient, None at All). The summary of results is shown in Table 7.

The respondents were asked to pick five of the fringe benefits considered most relevant to them and another five as the least relevant. The ones mentioned most, based on a frequency count, were then identified as either among the most or least relevant. The summary of results is shown in Table 8.

Three fringe benefits appear to be most popular among the respondents: medical benefits, car plan, and housing program. There is no apparent consensus on the others. Three benefits appear to be the least popular: insurance, credit facilities, and bonus.

Caution should be observed in drawing conclusions from the survey results. It is evident from some of the questionnaires that the respondents did not know of some of the benefits listed, or their significance. With proper explanation, it is possible that the preferences would change for some of the items.

CONCLUSIONS

Since training is capital-intensive, it is being undertaken more by the government than by the private sector. A good majority of the trainers are employees of the central or state government. They are treated just like any one else in the bureaucracy whose identity easily fades into obscurity. Only in very exceptional cases do they enjoy certain extra privileges, such as free housing for Indonesian trainers.

Private industries pay two to five times more than the government for trainers of the same qualification. In addition, career growth is perceived to be faster. However, aside from their very competitive selection process, the major drawback pointed out is the possibility of retrenchment during hard times. In contrast, there is security and stability in government employment. In India and Indonesia, the public option is preferred by many. Employment with private training institutions is not considered an attractive alternative, since the majority of them pay distinctly less.

Table 6: **Summary of Rating on Teaching Environment**

Inputs/Support Elements	India	Indonesia	Malaysia	Singapore	Thailand	Others	Average
1. a. Quantity of workshop equipment	76	73	61	76	49	58	66
b. Quality of workshop equipment	79	72	58	72	52	62	66
2. a. Quantity of laboratory equipment	63	68	55	76	44	44	58
b. Quality of laboratory equipment	71	68	51	73	47	48	60
3. Availability of workshop materials	72	70	62	83	59	60	68
4. Availability of laboratory materials	57	68	53	77	56	44	59
5. Relevance of curriculum	73	70	71	73	56	76	70
6. Quality of student inputs	67	67	58	64	62	75	66
7. Adequacy of staff development	55	68	59	74	52	58	61
8. Adequacy of management support	60	71	56	69	55	71	64
Average	67	70	58	74	53	75	66

Table 7: Summary of Ratings on Salaries and Fringe Benefits

Item	India	Indonesia	Malaysia	Singapore	Thailand	Others	Average
1. Salary	65	76	66	80	63	63	69
2. a. Transportation allowance	33	38	61	76	59	40	51
b. Food/Clothing allowance	34	67	49	48	52	42	49
c. Dependents' allowance	35	35	36	50	56	30	40
3. Vacation leave	56	56	70	81	64	72	67
4. Sick leave	76	59	80	81	74	69	73
5. Death benefits	65	52	43	61	61	42	54
6. Medical benefits	65	65	77	80	61	46	66
7. Insurance	65	53	34	52	39	31	46
8. Retirement plan	70	48	71	55	64	45	59
9. Credit facilities	41	35	52	52	60	34	46
10. Car plan	33	35	70	79	48	30	49
11. Housing program	56	56	72	81	38	29	55
12. Scholarship grants	36	37	50	78	52	45	50
13. Professional chairs	35	32	37	65	48	35	42
14. Educational loans	32	34	34	49	47	26	37
15. Merit/Salary increase	29	51	36	74	52	43	48
16. Travel	57	47	45	60	57	43	52
17. Bonus	37	30	27	45	28	37	34
18. Opportunity for additional income	31	42	33	69	53	32	43
Average	48	47	52	66	54	46	52

Table 8: Preferences of Respondents on Fringe Benefits

MOST RELEVANT FRINGE BENEFITS

*First Category**
- Hospitalization/Medical Benefits
- Retirement Plan
- Housing Program
- Car Plan

*Second Category**
- Transportation Allowance
- Vacation Leave
- Sick Leave
- Insurance
- Educational Loan
- Merit Salary Increase
- Travel
- Opportunity for Additional Income

LEAST RELEVANT FRINGE BENEFITS

*First Category**
- Insurance
- Credit Facilities
- Professional Chairs
- Educational Loan
- Travel
- Bonus

*Second Category**
- Vacation Leave
- Death Benefits
- Car Plan
- Housing Program
- Scholarship Grants
- Opportunity for Additional Income

* First category includes those benefits most preferred (or least preferred) by the majority of respondents in three or more countries. Second category includes those benefits most preferred by the majority of respondents in one or two countries.

The overall attitude of the trainers towards the job and the organization may be rated as above-average at 78 index points. (In the weighting system used in this survey 100 index points is outstanding, 60 average and 20 very poor.) Intercountry variations are notable, with Singapore trainers expressing the highest level of satisfaction, followed by Indonesia and India, and then by Malaysia and Thailand (Figure 1).

Three factors (Figure 2) appear to have attracted the respondents

Figure 1

OVERALL ATTITUDE TOWARD THE JOB AND THE ORGANIZATION

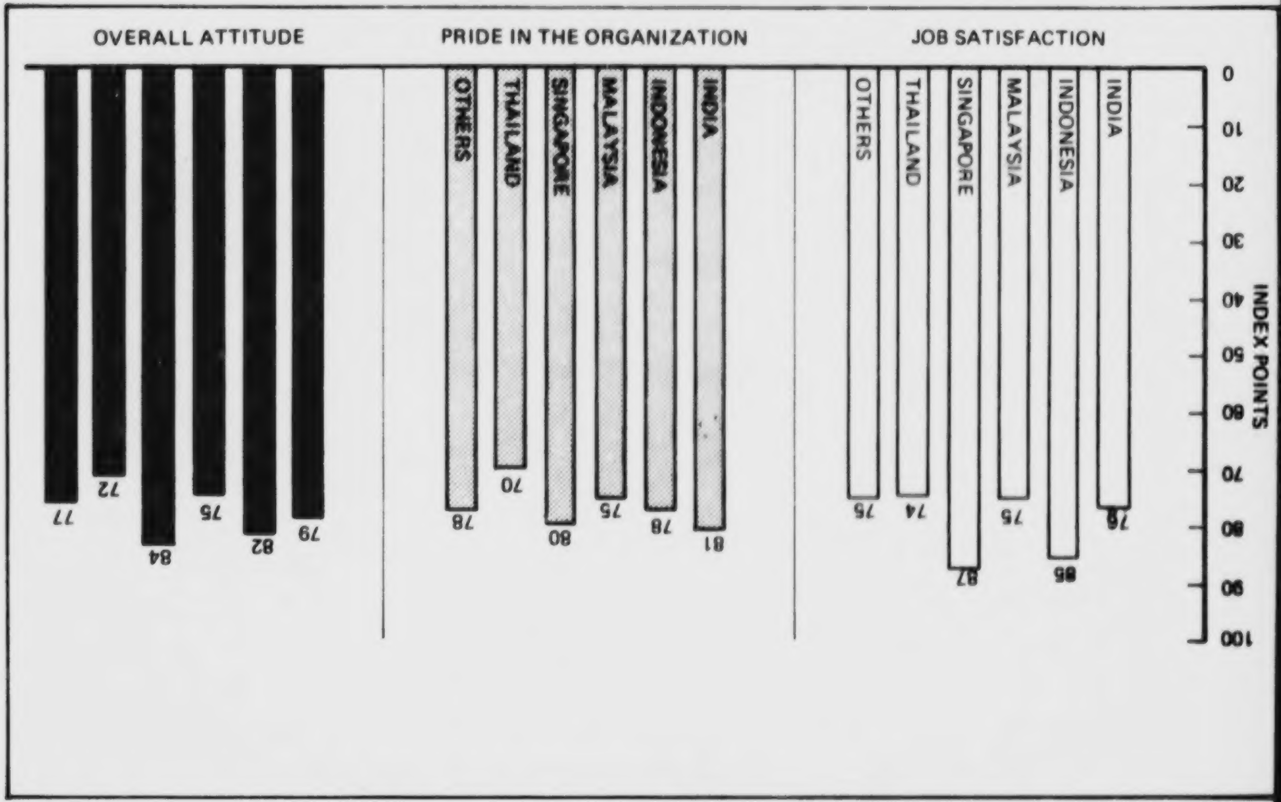
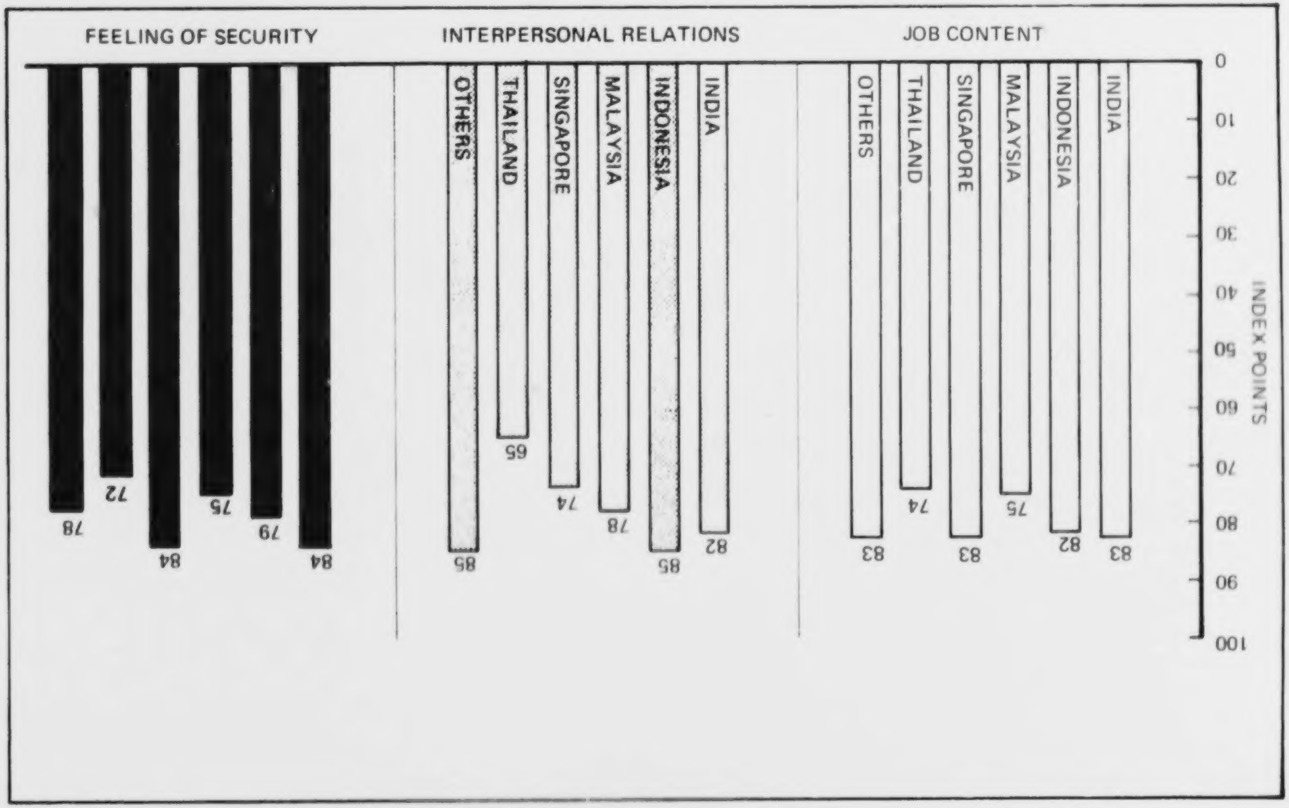


Figure 2

POSITIVE FACTORS



to become trainers in the first place and later made them relatively happy on the job: job content, friendly interpersonal relations, and job security and stability. The job is perceived as satisfying because it uses their present skills, gives a chance to learn new skills, and appeals to their idealism. One respondent commented that he does not mind much the low salary and fringe benefits because "teaching is a noble profession". Another said that the job "gives me satisfaction because my ex-students are all over the country and doing well in their business".

The degree of dissatisfaction was observed to be highest on four factors: salaries and fringe benefits, work area, and physical facilities (Figure 3). It is interesting to note that the absolute value of salaries appears to have no correlation with the feeling of sufficiency. For instance, while the average salary of trainers in Malaysia is five times more than that in Indonesia, the former's rating on the sufficiency of salaries was only 48 index points as compared to the latter's 67 index points. A plausible explanation is that the more relevant comparison is between the salaries of trainers and their alternative salary opportunities, such as in private industries within their own country, rather than with salaries in other countries. The higher the salary differential between the trainers and their counterparts in private business (assuming a certain degree of mobility as in Malaysia), the greater is the feeling of insufficiency. The case of Singapore is different, because the salary level of trainers is competitive with that of industry. The rating the survey respondents gave to work environment could reflect more of the state of the particular institutions they are affiliated with than of the majority of the country's institutions. A respondent from a newly built, foreign-funded training center would certainly rate his work as comfortable although the rest of the training centers in the country are in a poor condition. The same could be said for their ratings on physical facilities, workshops and laboratories. On these aspects, the insufficiency of the survey sample makes intercountry comparisons harder. Suffice it to say that the majority of trainers from various countries participating in the survey gave quite low ratings on these factors.

Three other factors were rated just a little higher than average and merit a closer look: career prospects, management and other support elements (Figure 4). The average rating is 70 index points which is quite low. Again, Singapore, India and Indonesia scored more than the average, while Malaysia and Thailand were below the average.

One lead worth pursuing is the availability of alternative jobs for trainers within their respective countries. In countries like India and Indonesia, the degree of mobility of trainers in government is quite low precisely because alternative jobs in private industry are limited and

Figure 3
NEGATIVE FACTORS

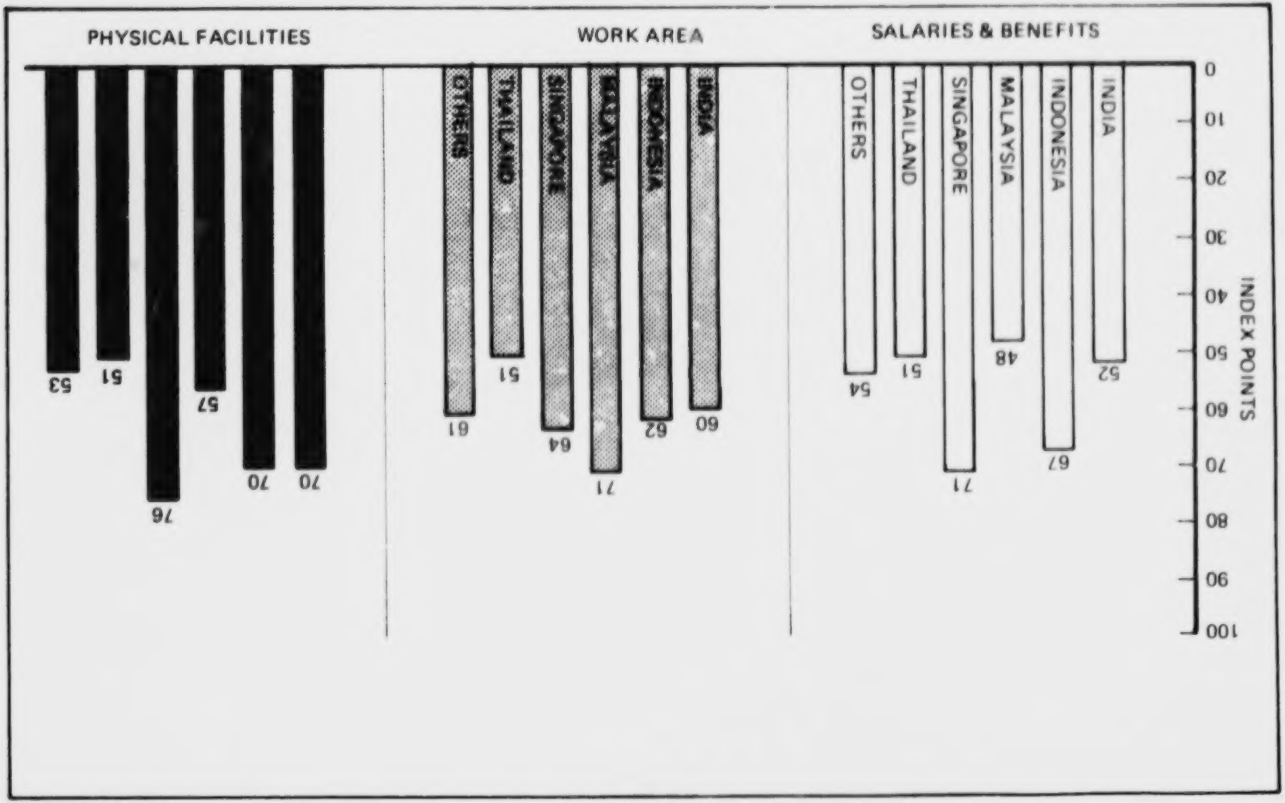
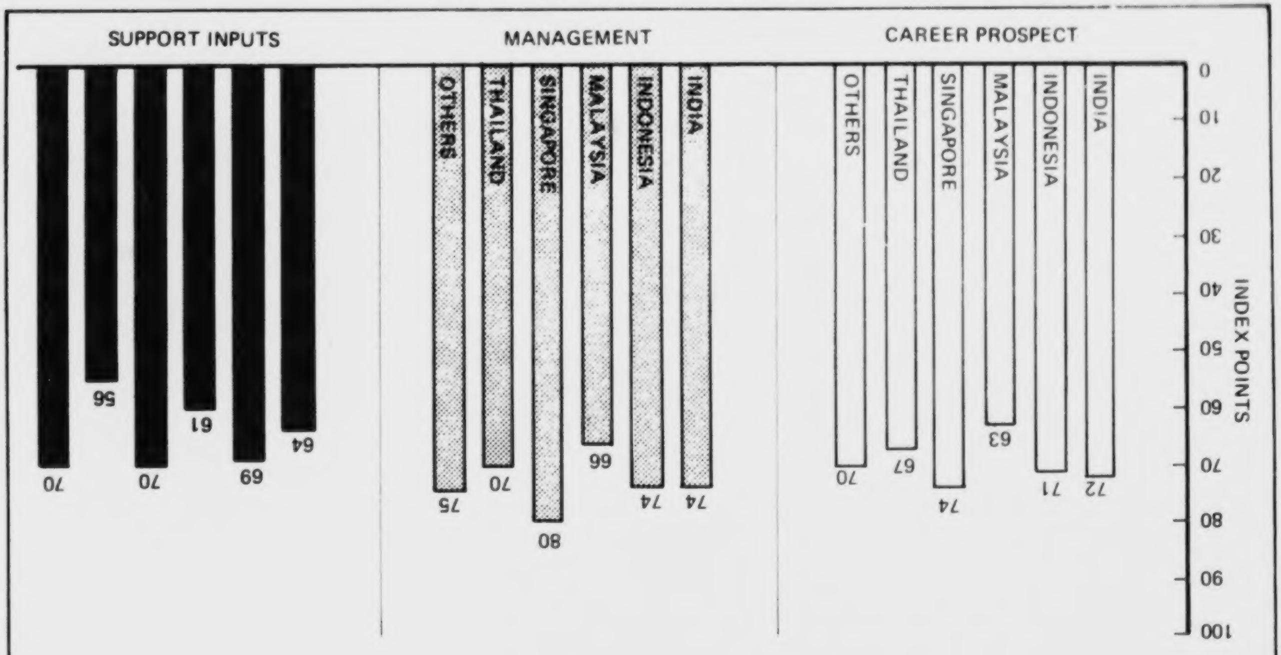


Figure 4

FACTORS WHICH NEED IMPROVEMENT



highly competitive. Thus, there is a tendency for them to stick it out in their present job and build a career out of it. In Malaysia and Thailand, industrial opportunities are relatively more accessible, and turnover rates are higher. In Singapore, the perception is that career prospects of trainers in government are not too different from those in industry.

Another reason for the low rating on career prospects, particularly in Malaysia, could be the policy requiring a degree for promotion to higher ranks. One respondent commented on the "discrimination in pay between the graduates and nongraduates called upon to do the same job". In the case of Thailand, some steps have been taken to solve a similar problem: trainers lacking in academic qualification are given opportunities to advance by taking cognizance of their work experience as equivalent in weight to certain academic requirements. However, the maximum level they can attain is still limited: trainers who are civil servants with academic credentials may go up to become directors, whereas permanent employees without academic qualifications cannot aspire for such positions without further studies.

The next area that needs to be looked into is that of management, in terms of policies and logistics, and feedback on performance. A similar pattern could be noted on the ratings – Singapore followed by India and Indonesia, the lowest being Malaysia and Thailand. The other factors, lumped together under the heading "support elements" include such indicators as perceptions on the relevance of the curriculum, quality of student inputs, adequacy of staff development, and adequacy of management support.

AGENDA FOR ACTION

A national commitment to training has to be both heard and seen. A clear perception that training is a national priority would engender among trainers a sense of importance of their contribution and among others a sense of perspective about the profession.

Some national policies have to be reviewed to achieve a greater parity between academic qualifications and industrial work experience of trainers. In some countries like Thailand and India, this system has been established and recognized but not so in others.

Studies should be undertaken to explore ways of improving trainers' remuneration, especially in regard to benefits they find most relevant: housing programs, hospitalization/medical benefits, retirement plan, car plan, and leave. Other benefits such as educational loans, opportunities for consultancies, international fellowships, etc. should be also considered.

There is need to improve the management of training institutions, through effective management and supervisory development programs, particularly for the heads of such institutions. At the national level, the efforts of different agencies/ministries demand coordination.

There is also a need for research on the role and job conditions of trainers and to validate implicit assumptions about the correlation between these factors the trainers' actual job performance. It is the most logical starting point.

Appendix 1

Regional Workshop on Technical/Vocational Teacher Training
SURVEY QUESTIONNAIRE

The purpose of this survey is to find out the remuneration system and conditions of employment of Trainers and Instructors in different Asian countries. Your answers will be useful in the preparation of a paper to be presented at the captioned Workshop and, in addition, guide policymakers in developing policies and programs that could make the job of Trainers and Instructors more satisfying. This questionnaire will be kept confidential.

This survey is useful only if you answer it honestly and completely. There are no correct or wrong answers. Give the answers that truly reflect how you feel or what you know. DO NOT SIGN YOUR NAME.

Part I

Please fill in the blank space provided opposite each item or check the box opposite each item where appropriate.

1. City/Country : ______________________________
2. Age : ______________________________
3. Sex : male ☐ female ☐
4. Civil Status : married ☐ single ☐
5. Position Title : ______________________________
6. Qualification(s) : ______________________________
7. Area of Specialization (e.g. civil trades, chemistry, communication, etc.): ______________________________
____
8. Contact hours with students:
   a. ______ hours per week
   b. ______ hours per year
9. Length of work experience in area of specialization: _______ years
10. Length of work experience in:
    a. Teaching : _______ years
    b. Nonteaching activities: _______ years
11. Type of organization you work with:
    a. Government ☐ Private ☐ Semi-Government ☐
    b. Academe ☐ Industry ☐ Others ☐

Part II

Please read each statement carefully and indicate your answer by checking the appropriate space provided opposite each statement.

	Strongly Agree	Agree	Neutral	Dis-agree	Strongly Dis-agree
1. Considering everything, I am satisfied with my job	_____	_____	_____	_____	_____

	Strongly Agree	Agree	Neutral	Dis-agree	Strongly Dis-agree
2. I have the opportunity to learn new skills in my job	_____	_____	_____	_____	_____
3. My job makes use of many things I can do well	_____	_____	_____	_____	_____
4. I can see clear career paths for my development in this job	_____	_____	_____	_____	_____
5. I feel I am in a "dead-end" job	_____	_____	_____	_____	_____
6. The requirements for promotion in my job are reasonably clear	_____	_____	_____	_____	_____
7. Interpersonal relations among employees tend to be friendly and informal	_____	_____	_____	_____	_____
8. My supervisor provides the help training and guidance necessary to improve my performance	_____	_____	_____	_____	_____
9. This organization pays enough concern for the continuing development of its trainors and instructors	_____	_____	_____	_____	_____
10. I know where I stand with my superiors regarding my performance	_____	_____	_____	_____	_____
11. Management provides adequate resources for me to be able to do my job right	_____	_____	_____	_____	_____
12. My work area is often physically uncomfortable (too hot, too cold, stuffy)	_____	_____	_____	_____	_____
13. Relative to other similar organizations, my organization provides better salaries and fringe benefits	_____	_____	_____	_____	_____
14. I feel secure and stable in my job in this organization	_____	_____	_____	_____	_____
15. I am proud to tell my friends what organization I work for	_____	_____	_____	_____	_____

Part III

In a scale of 1–10, with 1 representing *very poor* and 10 representing *excellent*, please rate the following items related to your job by encircling the appropriate number provided opposite each item.

1. a. Quantity of workshop equipment	1	2	3	4	5	6	7	8	9	10
b. Quality of workshop equipment	1	2	3	4	5	6	7	8	9	10
2. a. Quantity of laboratory equipment	1	2	3	4	5	6	7	8	9	10
b. Quality of laboratory equipment	1	2	3	4	5	6	7	8	9	10
3. Availability of workshop materials	1	2	3	4	5	6	7	8	9	10
4. Availability of laboratory materials	1	2	3	4	5	6	7	8	9	10
5. Relevance of the curriculum	1	2	3	4	5	6	7	8	9	10
6. Quality of student inputs (in terms of preparedness to tackle the curriculum)	1	2	3	4	5	6	7	8	9	10
7. Adequacy of staff development program	1	2	3	4	5	6	7	8	9	10
8. Adequacy of management support	1	2	3	4	5	6	7	8	9	10

Training Technical and Vocational Teachers

Robert E. Norton

The training of teachers has long been recognized as an international as well as national concern. During the 1960s and 1970s, there was general dissatisfaction with many of the teacher/instructor training programs in the United States. Many of these programs emphasized the theory of teaching rather than focus upon instructional skills needed to be successful on the job. Some states still lack adequate numbers of vocational instructors who possess both the technical and professional skills needed to be a successful instructor.

Many postsecondary training institutions recruit highly qualified technical experts from industry as part-time and full-time instructors. Unfortunately, many of these persons are thrust into instructional roles with very little professional preparation. When these experts do not possess the teaching skills required to be successful, they quit their jobs out of sheer frustration. Most of our vocational, technical and industrial training centers have found out that "teaching skills require just as much care and fine-tuning as technical and mechanical skills".

On the international scene, it is also quickly apparent that the training of teachers is high on the list of factors needing attention if the human resources of most countries are to be effectively utilized. Two brief citations will serve as examples of this need:

- The members of the Technical Committee of APSDEP, meeting in Manila in July 1979, agreed that the "training of key personnel, particularly trainers and instructors, was an area of primary concern. The representatives of the governments expressed a willingness to share whatever expertise and experience they possess in regard to training systems, materials, and facilities through APSDEP".[1]
- "A priority amongst the needs which ILO is called upon to satisfy is the need for training at all levels. Whilst Asia and the Pacific possess the manpower required for carrying out the tasks of economic and social development, they suffer from a shortage of trained people and training expertise without which their human resources cannot be effectively utilized."[2]

Granted that there is a worldwide need for effective instructor training programs, what are some of the specific instructor training needs that must be addressed? Information available from both research and practical experience suggests at least the following specific needs:

- *The need for more, and more competent, instructors in many occupational areas.* The shortage of qualified instructors in some occupational areas is a severe handicap to the social and economic development of some countries.

- *The need for instructor training programs that are based on the actual job requirements of the trainers and instructors.* Too many courses and workshops for instructors are still emphasizing theoretical concepts in hopes that the trainees will, largely on their own, be able to apply those concepts to practical instructional situations.
- *The need for instructor evaluations that are performance-oriented rather than knowledge-oriented.* Most often, instructor trainers have assessed instructors' teaching skills using primarily cognitive and norm-referenced assessment methods. There is a false assumption inherent in that approach: The instructor who knows about the teaching process will not automatically be able to perform effectively in the classroom and shop.
- *The need to provide instruction that can be tailored to the individual needs of the instructor in training.* Educators have long been aware of the need to individualize the learning process in order to accommodate each trainee's needs. While instructor trainers often tell the instructors they must individualize instruction for their trainees, their own classes are all too often conducted in a large-group, lockstep manner.
- *The need to provide instruction that allows for a variety of realistic learning experiences and options.* Different instructors have different learning styles and learning preferences; hence, it is important to provide for alternative learning experiences whenever possible.
- *The need for instruction that provides immediate and frequent feedback to the learner.* The instructor needs to know how well he or she is progressing toward achieving the necessary teaching skills on a regular, almost daily, basis.
- *The need for instruction that holds both the instructor trainer and the instructor trainee accountable.* If both persons are important to the learning process, as most would agree, then they obviously share responsibility for the learning that should occur.
- *The need for instruction that is both cost-efficient and maximally effective.* Training is costly, so program effectiveness and efficiency need to be enhanced by focusing on actual requirements of the instructor's job – those competencies essential to the training/teaching function.

Given the needs outlined, it is apparent that the conventional approach to instructor training will not suffice. Many traditional and time-honored practices need to be replaced by a more scientific and systematic approach to instructor training.

To address these needs and other issues related to the training of technical and vocational teachers, this paper will focus on the following topics:

- Development of PBTE as a response;
- Research on teacher competencies;
- Development of teacher training curricula;
- Alternative teacher training schemes and modules;
- Effects of competency-based teacher training; and
- Occupational competency testing of teachers.

DEVELOPMENT OF A PBTE AS A RESPONSE

To respond to demanding teacher training needs, the staff at the National Center for Research in Vocational Education developed, with federal government support, an alternative approach to teacher/ instructor preparation called performance-based teacher education (PBTE).

PBTE is an approach to instructor preparation in which (i) the training program is based on the *competencies* (specific job tasks) required of successful vocational and technical instructors; and (ii) the instructor must not only obtain certain knowledge but is also required to *demonstrate* the essential teaching skills in an actual instructional situation.

There are five essential elements and seven desirable characteristics[3] that serve to establish the operational framework for any PBTE program. The *essential elements* are as follows:

- Competencies to be achieved by the instructors are carefully identified, verified and made public in advance.
- Criteria to be used in assessing achievement and the conditions under which achievement will be assessed are explicitly stated and made public in advance.
- Assessment of competency takes the instructors' knowledge and attitudes into account but depends upon actual performance as the primary source of evidence.
- The instructional program provides for the individual development and evaluation of each of the competencies specified.
- Trainees progress through the instructional program, at their own pace, by demonstrating the attainment of specified competencies.

The additional elements – the *desirable characteristics* – associated with most PBTE programs may include any or all of the following:

- Instruction is individualized to the maximum extent possible.
- Learning experiences are guided by immediate feedback.
- Emphasis is on meeting exit requirements.
- Instruction is individually paced rather than time-based.
- Instruction is, to a considerable extent, field-centered.
- Instruction is often modularized and uses materials with both required and optional learning activities – to achieve flexibility and provide for various learning styles.
- The program as a whole is carefully planned and systematic.

RESEARCH ON TEACHER COMPETENCIES

The first question that needed to be answered was: What teaching skills does a person need to possess in order to be an effective vocational-technical teacher? Under the sponsorship of the U.S. Office of Education, the National Center began work in 1967 to determine the professional competencies required of vocational instructors. Approximately 1,000 vocational instructors, instructional supervisors, and teacher trainers were involved in the initial identification and verification of 384 job tasks considered important for vocational instructors in the various occupational areas of concern. The 384 job tasks were then clustered into ten categories representing major areas of instructional responsibility.

The initial teacher competency identification research base has been added to four times since 1974. In 1978-1981, research was conducted using the DACUM (Developing A Curriculum) job analysis procedure to identify the competencies needed by teachers who work with students having some type of *special or exceptional need* (the handicapped or disadvantaged).

During 1981–1982, two additional areas of concern were again addressed using the DACUM job analysis procedure. The areas researched included the competencies needed by teachers who needed to help their students further develop their *basic skills* (reading, writing, speaking, computing) and the competencies needed by teachers who were wanting to *implement competency-based education*.

Finally, in 1985, research was conducted to identify and nationally verify the competencies important to successful *teachers of adults*. Again, the DACUM process was utilized.

DEVELOPMENT OF TEACHER TRAINING CURRICULA

Given this research base, the National Center, under sponsorship of the U.S. Office of Education, initiated development of a comprehensive set of curricular materials that would meet the training needs of vocational instructors and incorporate the essential elements of PBTE. The materials that resulted from this endeavor are products of a sustained research and development effort geared to the actual preparation needed by persons who expect to teach effectively.

Nature of materials. The curricular materials are in the form of individualized learning packages, or modules, each of which has as its base one or more of the competencies identified and nationally verified. By basing the modules on the identified competencies, there is assurance that the objectives of the modules represent competencies actually needed by vocational instructors, at both the secondary and postsecondary levels, and in all occupational areas.

Each module provides learning experiences that integrate theory and application; each culminates with criterion-referenced assessment of the instructor's performance of the specified competency. The materials are designed for use by individuals or groups of teachers/instructors working under the direction and with the assistance of instructor trainers or other professional staff acting as resource persons.

The design of the materials provides considerable flexibility for planning and conducting performance-based preservice and in-service instructor training programs to meet a wide variety of individual needs and interests. The materials are intended for use by universities and colleges, state departments of education, postsecondary institutions, local education agencies, and others responsible for the professional development of vocational teachers or instructors.

Module development. The module development process was structured to ensure maximum involvement of persons representing all occupational areas and who were actively engaged in vocational instructor preparation. Each module was originally developed in cooperation with vocational instructor trainers at Oregon State University, Corvallis, and University of Missouri-Columbia. National Center staff also worked on-site with the module writing teams.

A system of development, review and revision was followed by the writing teams at each of these sites during the initial module development. Following development of each module to the satisgaction of the faculty at the site, the module was then forwarded to the National Center and the other university for review and critique. Then a synthesis of all faculty and staff reviews was developed, and the module was revised by National Center staff.

Preliminary testing and revision. Initial testing of the PBTE materials was carried out during 1973–1974 at Oregon State University, University of Missouri-Columbia, and Temple University. Each of the modules was used by a minimum of ten preservice and/or in-service vocational instructors at one or more of the test sites. Reaction forms were completed by each instructor for each module used and by each instructor trainer (resource person) for each module he or she administered. In addition, in-depth taped interviews were conducted to clarify and gain additional feedback from instructors and resource persons for a sampling of the modules tested. Several individual modules and entire categories of modules were also reviewed and critiqued by independent consultants and subject matter experts during this phase of the project.

Using the inputs from instructors and resource persons, and consultant reviews, each of the modules underwent a major revision of content and format. The typical instructional sequence for National Center modules, which reflects the revised format, is illustrated in Figure 1. This major revision was initiated by National Center staff during the summer of 1974, with completion occurring in the spring of 1976.

Advanced testing. Initially, three advanced testing sites were selected and testing began during the winter of 1975. During the spring and summer of 1975, advanced testing was also initiated at four self-sponsored sites. In the fall, ten additional advanced testing sites were added through U.S. Office of Education sponsorship of a National Institute for PBTE.

From 1975 through 1976, advanced testing of the materials was conducted at the 17 sites, representing wide geographic areas and settings as well as several differing PBTE program structures. Feedback was gathered from each trainee and each resource person using the modules to further improve the materials and to document their effectiveness. More than 7,500 preservice and in-service instructors and 250 instructor trainers and other resource persons participated in the testing and provided feedback to the National Center. This user feedback provided information concerning the characteristics of the user and how well the materials served his/her needs.

Advanced testing data showed the modules to be highly effective in developing the specified competencies in both preservice and in-service training programs. Pre/post-estimates of instructor trainee performance showed increase in ability to perform the specified competency for each of the 100 modules. Furthermore, the increases were statistically significant at the 0.01 level of confidence for 98 of the 100 modules. Further, the subjective reactions of both instructor trainers and trainees regarding the quality and utility of the materials were highly positive.

Refinement, publication and dissemination. The National Center completed an agreement for commercial publication of the PBTE materials in mid-1976. At that time, the publisher, American Association for Vocational Instructional Materials (AAVIM), and National Center staff jointly determined the final format of the materials. The publisher initiated incremental release of published materials in March 1977, with release of the last materials occurring in summer 1978.

The National Center's curricular materials consisted initially of 100 PBTE modules, clustered into ten categories, and related supportive materials. Since 1982, 32 additional modules in four additional categories have been prepared.

Joint dissemination activities have been and continue to be carried out by the National Center, by the publisher, and through federal, state and regional sponsors to provide orientation and training for effective implementation and use of the PBTE curricular materials.

In a performance-based training program, *the resource person* (instructor trainers, instructional supervisor or staff development coordinator) has a unique and essential role to perform. This role, which includes the functions of serving as advisor, facilitator and assessor, is very different from the traditional roles performed by instructor trainers and staff development leaders.

The National Center's field-testing and training experience with many different educational institutions repeatedly reinforced the need for the adequate training of PBTE users. Hence, both the developer and publisher strongly recommend that institutions or other agencies or countries planning to use these materials arrange for the provision of adequate training to ensure the most effective use of the materials and concepts.

Henry W. Puzio, Training Officer for Lincoln Technical Institute in Union, New Jersey, recently stated:

> In early 1986, Lincoln schools decided to implement the Performance-Based Teacher Education Program for the development and training of newly-hired instructors. Further, it is used as a tool for refining the skills of the veteran instructor. The key to the program's success is the resource person. It is important that this individual be totally familiar with the PBTE training process, motivated and committed to the goals and objectives of the program. It is also important that the instructional staff understands the value of PBTE and the benefits that can be derived from it.

> In the final analysis, a viable teacher training program is extremely beneficial to the success of our schools and our students.[4]

ALTERNATIVE TEACHER TRAINING SCHEMES AND MODELS

Full-scale, as well as partial, implementation of the PBTE concepts and materials has occurred at many public and private agencies across the United States. Vocational teachers and instructors, industrial trainers, staff development coordinators, local and state supervisors, and many others involved in the professional preparation of persons for teaching roles at all levels are using the materials.

In addition, more than 3,000 different agencies and over 1,500 individuals have purchased the modules, including over 1,700 educational agencies and over 425 business and industrial firms. The primary users have been colleges and universities, which represent 56 per cent of the total sales.

Organizations in all 50 states, five U.S. territories, 11 Canadian provinces and 40 other foreign countries also have purchased the materials. Because of the international demand for the materials, distributorships have been established in the United Kingdom, Australia and Pakistan.

The materials are being used mainly by (i) training institutions concerned with preservice and in-service teacher/instructor preparation and (ii) private and public agencies concerned primarily with staff development or the in-service training of instructors.

Teacher education use. As one might expect, the most extensive use of PBTE concepts and materials in the United States is occurring in the colleges and universities that have teacher preparation as one of their major responsibilities. Of the 1,700 educational agencies that have ordered the modules, 425 are colleges and universities. Some of these institutions use the materials primarily in their preservice programs, while others use them in their in-service courses and workshops.

Major use has occurred in what might be described as a "blending" approach whereby selected modules are substituted for specific units of a given course. Extensive use has also occurred in "total course substitution" approaches whereby one or more courses are taught in a performance-based manner using a cluster of modules as an alternative to lectures. In several institutions, all the professional preparation required of teachers is offered through a total program converted to the use of PBTE concepts and materials.

Staff development use. The use of PBTE materials by organizations other than colleges and universities for staff development or in-service training represents 42 per cent of total module sales. The major users in this category are as follows:

- Public and private secondary schools;
- Public and private postsecondary institutions (two-year);
- State education agencies;
- Business, industry and labor organizations; and
- Noneducational government agencies.

In the over 800 secondary schools and over 600 postsecondary institutions purchasing the materials, the modules are used in staff development programs run by the institution itself. Frequently, they are used with part-time, as well as full-time, instructors to help them acquire critical teacher "survival skills", and in some states to meet certification requirements.

Most of the 50 state departments of education have purchased either sets of the modules for placement in area vocational school staff libraries or individual modules for use in local, regional and statewide teacher in-service education workshops.

In addition to the educational agencies, more than 450 businesses, industries and labor groups are using the modules as part of their instructor training programs. The materials have been purchased by such well-known companies as Caterpillar Tractor, General Electric, International Business Machines, Kodak, Mobil Oil, Sears and Roebuck, Union Carbide, and United Airlines. Among the noneducational government users are the U.S. military, state and federal corrections and law enforcement agencies, and the U.S. Department of Agriculture's forest and soil conservation service.

An Overview of Selected PBTE Programs

Brief descriptions of some of the applications of PBTE principles and materials in different types of institutions are presented here.

- *PBTE in Colleges/Universities*

  Temple University's Vocational Intern Teaching Applied Learning (VITAL) Program

  The initial vocational certificate requires completion of 30 PBTE modules. Senior teacher educators, field resource persons, resident resource persons, in-service teachers at secondary schools, and intern teachers participate in the program.

Indiana University of Pennsylvania's Center for Vocational Personnel Preparation

This field and performance-based vocational teacher education program rests on Temple's model and serves both preservice and in-service vocational teachers. All the PBTE modules are used.

University of Central Florida

PBTE is used for in-service and preservice teachers, with an 85 per cent in-service focus. The geographical area served includes rural, sparsely populated counties, and the individualized program is adaptable to a field-based setting. Both undergraduate and graduate level programs use the modules.

University of Alaska, Juneau

PBTE modules are used in the vocational education master's degree program, with a minimum of nine credit hours required in PBTE. The program serves teachers in all areas of this vast state through the use of resident resource persons and university-based field resource persons.

- *PBTE in Community Colleges/Industry*

Albuquerque Technical/Vocational Institute

PBTE has been integrated into their institutional Professional Development Plan. All teachers hired must demonstrate proficiency in 41 selected modules. The University of New Mexico's Department of Secondary and Adult Education works cooperatively with the Institute.

Bougainville Copper Limited, Papua New Guinea

This staff development program for industry trainers effectively uses the PBTE modules. Adelaide College of the Arts and Education, South Australia, provides the field-based program, adapting to the challenge of geographical distances.

- *Statewide Programs*

Arkansas

Certification requirements were established in April 1983 for all postsecondary vocational instructors. PBTE modules are the basis for the program, and all instructors must eventually acquire or demonstrate the competencies for the senior instructor level. A career ladder and merit pay system is an integral part of this statewide professional development program. Participation of instructors in this program is a condition of employment. Persons employed must progress as follows:

Provisional Instructor	→ Senior Instructor	→ Master Instructor	→ Instructor
11 modules required	31 modules required	33 additional modules	36 additional modules

Instructors who desire to remain at the Senior Instructor level may do so. Advancement to each higher grade also requires successful teaching experience and additional technical work experience.

Washington

The State Board for Community Colleges established a performance-based vocational teacher education plan for all its postsecondary institutions in 1979. An in-service training program to prepare resource persons was designed and implemented.

- *Adoption by National Associations*

(National Association of Trade and Technical Schools (NATTS))

In 1979, NATTS recommended to its 1,000 member institutions an instructor training program of 21 PBTE modules, selected to provide the core of teaching skills needed in program planning, instructional planning, execution, evaluation and management.

NATTS believes that professional development is an ongoing process; one that takes time and energy. As part of the NATTS commitment to the professional development process, three levels of recognition had been established for instructors at member schools who have completed PBTE modules.

Level I

Any instructor whose school has verified that the instructor has successfully completed 16 PBTE modules – including 11 modules from the 21 recommended by NATTS – will receive a Level I Professional Achievement Award from NATTS.

Level II

An instructor whose school has verified that the instructor has successfully completed 25 PBTE modules – including 11 modules from 21 recommended by NATTS – will receive a Level II Professional Achievement Award from NATTS.

Level III

Any instructor whose school has verified that the instructor has successfully completed 40 PBTE modules – including 11 modules from 21 recommended by NATTS – will receive Level III Professional Achievement Award from NATTS.

EFFECTS OF COMPETENCY-BASED TEACHER TRAINING

Educators frequently ask questions such as the following: What evidence is there that PBTE works any better than (or as well as) conventional teacher education and staff development programs? Why should we change to the PBTE approach unless there is significant evidence that it is better than what we are now doing? These are fair and legitimate questions. While the research needed to answer those questions conclusively is complex, expensive and fraught with difficulty, some answers are now becoming increasingly clear.

Four types of positive effects of PBTE have been reported by Adams, MacKay, and Patton[5] and by Bill Weaver (NATTS study): (i) effects on teacher education programs, (ii) effects on staff development programs, (iii) effects on teachers and instructors, and (iv) effects on students and classrooms.

Teacher education. Traditional teacher education has been content-based, time-based, group-paced, focused on the needs of the group, course-oriented, classroom-based, norm-referenced, instructor-centered, textbook-focused, based on general objectives, and has relied on subjective assessment criteria.

However, those who are being trained as instructors need to be able to apply what they learn to the situations they encounter, and their training must be based on actual job requirements rather than theory. Evaluations would be based on their performance in those situations. In addition, student instructors need to experience individualized instruction themselves in order to make use of its principles in their own teaching. PBTE is meeting these needs.

Teacher training institutions using PBTE cannot easily fit students into a general pattern. PBTE's emphasis is more on what abilities the students demonstrate at the end of the program than on what may be required for their entrance into the institution. Students are allowed to take varying amounts of time to attain mastery, and opportunities are given for them to "test out of" some competencies and proceed with the modules for the skills they need to work on.

According to the Adams study, PBTE has been especially effective in changing teacher education programs. It has accomplished the following:

- Increased the accountability of teacher training programs.
- Increased instructors' access to teacher training by providing self-contained instruction especially useful in rural and/or isolated areas.
- Increased the flexibility of teacher training in terms of getting the right training to the right instructor at the right time.
- Increased the productivity of teacher training programs by shortening the time required to certify vocational teachers.
- Reduced the variability and added cohesiveness to the content of vocational instructor training curricula through standardization of the skills vocational instructors are required to master.
- Significantly changed the role of the university trainer from a university-based classroom lecturer to a field-based learning facilitator working with instructors on a small-group and one-to-one basis.

Staff development. The number of community and junior colleges in the United States grew from 678 in 1960 to 1,230 in 1975. These two-year institutions serve an increasing number of students from nontraditional backgrounds, including unemployed, disabled, senior citizens, women taking courses that have not been traditional for women (i.e. trades and technology), parolees and part-time students. The prescribed curricula may be irrelevant to these students. The influx of nontraditional students has pointed to the need for nontraditional instruction. PBTE helps the staff of these institutions respond to the needs of a changed student body.

In recent years the emphasis on vocational/technical education in postsecondary institutions has increased. Many instructors in these two-year schools are hired directly from industry and have expertise in a specific area, but need to acquire a variety of teaching competencies. PBTE is effective for training these instructors and can help them immediately.

In 1982, NATTS surveyed those who had attended PBTE workshops. Of responses from 77 institutions, 71.4 per cent had established PBTE programs, and of these, 45.4 per cent had mandatory requirements for at least some of the teachers. A total of 64.3 per cent felt their programs to be successful or very successful. Those with successful programs stated emphatically that the teaching staff had gained greater awareness and knowledge of teaching techniques. More than half noted a decrease in students' complaints about teachers.

More than 450 noneducational agencies, in the areas of business, industry, labor, government and the military, have purchased PBTE modules and find them an efficient way to train personnel. For example, the nuclear facility in Seabrook, New Hampshire, has two staff development meetings a month, making use of the modules. Neal Wiggin of the facility commented, "Developing instructor competency is as important as developing operation and technical quality."

Teachers/instructors. Traditionalists insist that teaching is greater than the sum of its parts and worry that PBTE may reduce teaching to a series of sometimes trivial operations. Some say that working with modules is dull and neglects human interaction. Such critics forget that many aspects of traditional training of teachers were dull for both the educator and the student. Some educators prepared lectures and tests in isolation. In their new roles as resource persons they tutor, facilitate, advise, counsel and assess. They spend less time preparing lectures, writing and grading tests, and more time conducting discussions. Many find more human interaction in a PBTE program than in a traditional one.

The transition is not an easy one for educators who have already developed their own methods and styles. They have to change the way they manage their time and resources in order to match the individual needs of their students and keep records of individual progress. But their comments show that they find PBTE effective and satisfying.

The effects of PBTE on vocational teachers and instructors cited by Adams are as follows:

- Increased competency in teaching, especially in the areas of instruction planning, organizing content into units of instruction, student reinforcement, individualizing instruction, and student performance evaluation.
- Increased instructor responsibility for own learning and the ability to be self-evaluative.
- Increased instructor convenience in obtaining certification.
- Increased personal contact between instructors and instructor training faculty.
- Increased faculty confidence.

Classrooms and students. Students and their classrooms have also been affected by PBTE in the following ways:

- Improved communication between training institutions and local school districts.
- Increased use of competency-based techniques by teachers with their own students because instructors teach the way they are taught.
- Improved performance of local school administrators in evaluating teachers.

OCCUPATIONAL COMPETENCY TESTING OF TEACHERS

The National Occupational Competency Testing Institute (NOCTI) is a nonprofit educational consortium of states that has developed high-quality teacher occupational competency examinations in over 40 fields of employment. The NOCTI examinations for each occupation contain two parts: a *written test* that is concerned with knowledge of the occupation; and a *performance test* that examines selected manipulative skills of the occupation.

The NOCTI tests do not measure teaching skills. Instead they focus on the technical knowledge, psychomotor skills, understanding and analytical abilities that are normally required of an individual for successful practice in the occupation. Currently, 46 states and the District of Columbia support this important technical competency testing program for teachers.

SUMMARY

The National Center's PBTE materials have been widely adopted and have had a marked impact on vocational instructor training and staff development programs. The PBTE materials are more widely utilized than any other of the many products produced by the National Center for Research in Vocational Education.

The availability of high-quality, research-based and field-tested materials, coupled with the logical promise of the essential elements and desirable characteristics of PBTE programs, have significantly increased the responsiveness of teacher and instructor training programs to the needs of their clientele. The cooperative development procedures, extensive field testing, and the numerous institutional, state, regional and national workshops conducted to train resource persons contributed significantly to the dissemination of the concepts and materials and implementation of PBTE programs.

There is considerable evidence that PBTE programs are having a long-term impact on improving the quality and competence of vocational teachers and instructors. By providing a flexible and more individualized program, PBTE has enabled teachers to progress at their own best rate to achieve mastery of the desired competencies. It has also increased the productivity of some teacher education programs by shortening the time required for certification.

Since the National Center's PBTE efforts have met with success, it will not surprise anyone to learn that additional materials are being developed using the same basic research, development and dissemination methodology. Work in performance-based teacher education has continued through the development of the four new categories of PBTE modules, as well as through the revision of the original 100 modules to update their content and improve their graphics. A multistate consortium effort is also supporting the development of competency-based modules designed specifically for the preparation of local administrators of secondary and postsecondary vocational programs. Performance and competency-based education concepts and materials provide a promising alternative to the more conventional methods of instructor and leadership personnel training.

NOTES

1 Murthy Rao, S. N., *Regional Training of Trainer Trainers on a TCDC Basis*, Advanced Training Institute, Madras, October 1983.

2 Abourhanem, Andre, *Training of Trainers in Asia and the Pacific*, International Center for Advanced Technical and Vocational Training, Turin, February 1982.

3 The essential elements and desirable characteristics presented here are adapted from *Achieving the Potential of Performance-Based Teacher Education Recommendations*, American Association of Colleges for Teacher Education, Washington, D.C., 1974.

4 Puzio, Henry W., "The Importance of Teacher Training", *Career Training* (Journal of the National Association of Trade and Technical Schools), Vol. 3, No. 3, March 1987.

5 Adams, Kay A., Brenda MacKay, and Michael Q. Patton, *The Impact of the National Center's Performance-Based Teacher Education Curriculum*, The Ohio State University, Columbus, 1980.

Trade Skill Verification

H. Tachikawa

The national trade skill test system in Japan serves to test the skill of workers in accordance with the prescribed standards and certify such skill. Its purpose is to encourage workers to acquire skill, promote evaluation of the results of vocational training, improve the status of workers, and eventually contribute to the industrial development in Japan. The system came into being with the Vocational Training Law of 1969.

HISTORY

The trade skill test system was introduced in 1959 for five trade skills. In 1960 a measure was taken to link it with the regional vocational training competition, which selected representatives for the national competition, and in 1969 the Central Trade Skill Test Associations were established in all prefectures as an enforcement agency for the system. A review in 1973 led not only to reorganization and unification of the existing trades, but also to a revision of applicants' qualifications. A part of the Vocational Training Law was amended five years later to permit trade skill tests for single grades. Also, in order to strengthen the enforcement system on the national level, the National Vocational Training Judicial Person Central Association and the Central Trade Skill Test Association were unified, while on the prefectural level the Vocational Training Judicial Person Federation and the Trade Skill Test Association were merged. These led to the establishment of the Central Vocational Ability Development Association and the Prefectural Vocational Ability Development Association in each prefecture. The law was amended further in 1982 to provide trade skill tests for two trades, cooking and building cleaning, and a part of the trade test work was entrusted to the employers' organization previously designated by the Minister of Labor for enforcement of the system. The total number of applicants for the past 25 years up to 1983 was 2,783,000 while the successful applicants numbered 1,185,000. The number of trades covered by the system reached 135 in 1984.

ENFORCEMENT AGENCY

The Minister of Labor entrusts the administration of the trade skill test system to the prefectural governors and the preparation of tests to the Central Vocational Ability Development Association. The prefectural governors in turn entrust the acceptance of applications and administration of tests to the Prefectural Vocational Ability Development Associations.

The Central Vocational Ability Development Association and the Prefectural Vocational Ability Development Associations are legal entities, established in the center and prefectures with approval of the Minister and the prefectural governors, whose membership comprises organizations of enterprises and industries.

The Central Vocational Ability Development Association and the Prefectural Vocational Ability Development Associations appoint part-time trade skill test commissioners from among those who have special trade skill or knowledge. The selection of commissioners is confined to:

- experts in trade skill field, i.e. those who are holders of First Grade of the trade skill test in the respective trade; or holders of the mono grade of a skill test; or those who have over twenty years' experience in training in the field or education in respect of the respective trade skill, and hold or have held the position of at least a foreman;
- experts in technical field, i.e. those who hold or have held the position of at least a section chief in the department of technical or educational training in a plant or establishment;
- persons of knowledge and experience, i.e. those who have graduated from junior colleges (including technical colleges and former colleges) and majored in respective trades, and have over ten years' knowledge and experience; and
- those who have equivalent trade skills, technology, or knowledge and experience.

As regards cooking, Cooking Technology Trade Skill Center appoints the test commissioners in accordance with prescribed qualifications, and the National Building Maintenance Association does the same for the building cleaning trade.

The function of the central test commissioners is to prepare skill tests, paper tests, and grading standards for about ten persons in each trade. The function of the prefectural test commissioners is to administer the skill test and to direct, supervise and grade at skill test room, for at least three persons in each trade.

SELECTION OF TRADES

The basic principle of the trade skill test system is to cater to all trades which need such tests. So trades are selected for inclusion after considering their needs, the demand of the people concerned, the number of workers in the trades, the present state of training, and the national welfare.

GRADE CLASSIFICATION AND TEST STANDARDS

The trade skill tests include classified tests, first grade and second grade, for each kind of trade, and the mono grade (trade skill test without classification).

To clarify the content of trade skill tests, both the *subject* and *scope* of skill and paper tests are concretely prescribed for each trade skill and grade in Enforcement Regulations of the Vocation Training Law. Some trades use a selective subject system.

The *level* of the trade skill test for the first grade is of those who have reached the highest skill level as skilled workers, and the level of trade skill for the second grade is of those who have reached the skill level of acknowledged skilled workers; while the level of trade skill test for mono grade is of those who have reached the highest skill level as skilled workers.

Detailed rules are laid down for the standards of the trade skill test, and test questions are prepared strictly in accordance with them. While the standards and detailed rules are drafted by specialists of the Central Vocational Training Council, before finalization a trial trade skill test is conducted to determine whether the scope and level are really appropriate. The standards and rules are studied and revised from time to time in line with the evolving technology.

THE TEST SYSTEM

There are skill and paper tests for each trade: the skill test is to test the skill level in actual work, while the paper test is to determine the level of supporting knowledge.

The *skill tests* and guidelines for their administration are prepared by the Central Vocational Ability Development Association (and by the Cooking Center for the cooking trade) and approved by the Minister of Labor. The tests cover mainly actual work, and for the majority of trades the subjects are announced by the Prefectural Vocational Ability Development Associations in different prefectures.

The test generally lasts four to five hours; for some trades standard time and maximum time are prescribed. In some trades, in order to test practical judgment, element and paper tests are also prescribed in addition to the work test. Date and place of the test are communicated to the applicants by the Prefectural Vocational Ability Development Association.

The *paper tests* and guidelines for their administration are prepared by the Central Vocational Ability Development Association and approved by the Minister of Labor. The object is not only to test academic knowledge, but also to determine whether the applicant has the correct knowhow and judgment to perform the work.

In paper test, applicants examine 60 to 100 statements and indicate whether each is true or false. Scoring is calculated by subtracting incorrect answers from the number of correct answers. The test generally lasts two hours and is held throughout the country on the same day.

Exemptions from the test may be granted to qualified applicants, who have skills equivalent to the successful applicants of the skill test and the paper test.

Applications for trade skill tests are submitted to the prefectural governors through the Prefectural Vocational Ability Development Associations within the prescribed period. Applicants pay the fees to the Association together with their application. Those who are qualified to be exempted from skill tests or paper tests must apply for exemption with a document certifying such qualification.

The schedule of tests is shown in Table 1.

The *application fees* as of 1986 are: ¥12,500 maximum for the skill test and ¥2,300 maximum for the paper test, prescribed for each trade by the governor of each prefecture, for cooking and building cleaning by the Minister of Labor. Those granted test exemption are not required to pay.

QUALIFICATIONS FOR TRADE SKILL TESTS

The tests require in principle that the applicants have a period of experience in the trade, which may vary according to their school and vocational training careers. Such experience includes not only practical work, but also management, supervision, training, education and research in the trade.

SUCCESSFUL APPLICANTS

The successful applicants for the first grade and mono grade trade skill tests receive certificate of pass in the name of the Minister of Labor,

Table 1: Schedule of Tests

		Term	
Item		First	Second
Announcement of Ministry of Labour Enforcement program		Mid-February	
Announcement of each prefecture's enforcement		Late March	Mid-September
Acceptance of applications		From mid to late April	From early to mid-October
Skill test	Announcement of questions	Mid-June	Late November
	Enforcement	From late June to late September	From early December to late February
Paper test		From early to late September	From mid to late February
Announcement of successful applicants		Early October	Mid-March

and those for the second grade receive certificates in the name of prefectural governors. The certificate authorizes the holder to be called a certified skilled worker (for example, first grade garden designer). The prefectural official gazette announces the names of the successful applicants. For the cooking and building cleaning trades, the Cooking Center and the Building Maintenance Association put up notices listing the successful applicants.

The Minister of Labor issues certified skilled worker badges to the successful applicants so that they can be proud of their skill and the society can correctly value and respect them. Three kinds of badges are available: first grade certified skilled worker badge (gold); second grade certified skilled worker badge (silver); and mono grade certified skilled worker badge (gold).

ASSOCIATION OF CERTIFIED SKILLED WORKERS

The Association of Certified Skilled Workers is now established in 45 prefectures, having a membership of 141,000, including 108,000 certified skilled workers. The prefectural Association is established in 34 prefectures, having membership of 129,000, including 97,000 certified skilled workers.

The major activities of these Associations are: (i) training courses for raising the trade skill of certified skilled workers; (ii) holding lecture meetings for updating their knowledge; (iii) publication of an organ; and (iv) sponsorship, co-sponsorship and support of trade skill competitions.

The breakdown of 812 organizations composing the Association in 45 prefectures is: Association of Certified Skilled Workers by kinds of trade (615 organizations); Association of Certified Skilled Workers by region (125 organizations); and Association of Certified Skilled Workers by prefecture (5 organizations). The breakdown of 736 organizations composing the prefectural Association in 34 prefectures is: Association of Certified Skilled Workers by kinds of trade (536 organizations); Association of Certified Skilled Workers by enterprise (47 organizations); Association of Certified Skilled Workers by region (121 organizations); and Association of Certified Skilled Workers by prefecture (5 organizations).

AUTHORIZATION SYSTEM OF TRADE SKILL TEST BY THE PRIVATE SECTOR

The trade skill examination and certification system is established in order to improve the trade skill of workers, raise the social and economic position of the skilled workers, and complement the existing trade skill test system. The system is being administered as a national measure "to enrich the trade skill test work" prescribed in the Employment Measures Law, in accordance with the Trade Skill Examination and Authorization Rules of the Ministry of Labor.

An outline of the system is as follows:

- When a qualified body or nonprofit organization undertakes a project to examine and certify the level of knowledge and trade skill of workers, it may apply to the Minister of Labor for authorization. The Minister will authorize the project if it complies with the standard of authorization and is deemed useful for promotion of trade skills.
- The examination will be recognized as "authorized by the Ministry of Labor".
- When the authorized body grants titles to those who pass the trade skill examination, it shall use the titles previously approved by the Minister of Labor.

- If the authorized body no longer complies with the standard of authorization or has failed to submit the prescribed reports, the Minister of Labor may cancel the authorization.
- When the Minister of Labor authorizes a trade skill examination, he will announce the examination and the name of the authorized body in the official gazette. The same procedure will apply in the case of cancellation.

As of April 1986, eight kinds of trades, Hakone Zaiku, Kamakura carving, instrumentation, rope processing, industrial cleaning, road surface sign work, gem stone grinding in Yamanashi Prefecture, and pressurized transport of concrete are authorized.

AUTHORIZATION SYSTEM FOR IN-PLANT TRADE SKILL TEST

The Minister of Labor can also authorize a private company or group of companies to test the trade skill of workers if it is deemed useful for the promotion of trade skills.

The system is being administered in accordance with the Authorization of In-Plant Trade Skill Test Rules of the Ministry of Labor, to complement the evaluation system for trade skills, especially in areas such as changing technology and service industries.

An outline of the system is as follows:

- When a company or group of companies applies to the Minister of Labor for authorization, the Minister will authorize in-plant trade skill tests if they comply with the standard of authorization and is deemed useful for promotion of trade skills.
- The in-plant trade skill tests will then be recognized as "authorized by the Ministry of Labor".
- When the authorized company or group of companies grants titles to those who pass the in-plant trade skill tests, it shall use the titles approved by the Minister of Labor.
- If the authorized company no longer complies with the standard of authorization or fails to submit the prescribed reports, the Minister of Labor may cancel the authorization.
- When the Minister of Labor authorizes an in-plant trade skill test, he will announce the test and the name of the authorized company in the official gazette.

As of April 1986, six companies or groups of companies are authorized for 17 trades.

RESPECT FOR TRADE SKILLS

In order to promote respect for trade skills, a number of projects are now undertaken, some of which are indicated below.

- The system to commend outstanding skilled workers is to promote respect for trade skills, to improve both the position of the skilled workers and the level of their trade skills. It is also to lay a social foundation, so as to encourage young people to desire to become skilled workers of distinction, through the commendation of outstanding skilled workers at the highest level in Japan. Some 100 skilled workers are so commended every year by the Minister of Labor.
- A national competition of first grade certified skilled workers (trade skill grand prix) is held every year, co-sponsored by the Central Vocational Ability Development Association and the National Federation of Certified Skilled Workers. The object is improving further the skills of certified skilled workers spreading the idea of lifelong training and generating a trend of respect for trade skills. The first competition was held in January 1982. The trade skill grand prix is a skill competition of outstanding first grade representatives from each prefecture regardless of their age.
- The International Vocational Training Competition, commonly called Olympic Games of the trades, started in 1950 in Spain and, since then, has been held every year. The object of the Games are promotion of vocational training in participating countries, improvement of the level of trade skills, international communication and friendship among the young (21 and under) skilled workers. Japan participated in the 11th competition in 1962 for the first time and, since then, has established satisfactory records each time. The 28th competition is scheduled to be held in Japan.
- In order to promote the vocational ability of disabled persons, to give them confidence and pride to participate in the society as skilled workers, and at the same time to deepen the understanding and recognition of society of disabled persons, a national abilympic is held every year sponsored by the Physically Handicapped Persons' Employment Promotion Association.

PART III

DEVELOPING THE INSTRUMENTS

Module Training in Japan

Setsuo Yasue

In January 1978 the Vocational Training Bureau of the Ministry of Labor, later redesignated as the Human Resources Development Bureau, made the following declarations:

- It has become important to conduct vocational training for persons who are unemployed or who are to shift to another job and to carry it out in a dynamic and flexible manner. There is a need to provide them with skills which will make them employable, keeping in view the conditions of the labor market.
- A module training system will be designed and implemented to achieve occupational capability redevelopment and diversification of admission requirements.

It was thus decided to incorporate module training in the training courses at public vocational training facilities in April 1978.

INTRODUCTION OF MODULE TRAINING

In preparation for the introduction of module training, the Vocational Training Bureau established a committee for providing guidance on the compilation of vocational training curriculum. The committee examined four training areas – welding, sheet metal, plumbing and sewing – and established guidelines for curriculum development.

In 1978, 15 schools (ten prefectural schools and five schools established by the Employment Promotion Corporation) designated by the Vocational Training Bureau ran four courses on a trial basis. In the following year, module training began on a full scale, and in each subsequent year, four or five training courses (based on as many occupational groups) were designated additionally by the Bureau. As of February 1986, the number of training courses was 27.

The completed procedure for guidance on the compilation of module training curriculum has been formulated by the Bureau (Human Resources Development Bureau at present) and distributed to related institutions.

THE CONCEPT

The theories on which the module training is based may now be briefly indicated.

Broadly, when a job or task is done, it means that a series of actions has been taken by a person. In other words, the job is structural, and its structure is made up of the abilities with which a person copes with the separate units of action. The important thing for the formation of one's behavioral ability is to study oneself so that one can take action in a reasonable manner and equip oneself with the ability to take optimum action by structuring the unit actions at the place where a job is assigned.

What is the training for the formation of such behavioral ability? Trainees may be located in a place of action, and instructor's one-sided teaching is not sufficient for learning. Whoever learns must take action for his learning in realistic circumstances. Moreover, whatever the form of learning, a genuine pattern presupposes full understanding by each one of the trainees. Such learning requires a training system with the following components.

The first component is the basic blueprint of the system. The blueprint clarifies by what action units a targeted task is accomplished, how each unit, when viewed in terms of action, is tied in with another (as is the case with a compound of basic simple elements) and how the whole structure of action is composed.

The second is the stages of learning prepared in line with this basic blueprint.

The third is software and hardware of teaching, the software including:

- instruction of action
  - the way learning is stepped up (procedure)
  - the way learning is conducted (method)
  - questions and tasks (stimulus and response)
  - checking of results (diagnosis and assessment)
- content of learning and explanation

and the hardware including:

- teaching materials as "things" which produce an immediate impact on action
- teaching aids for presentation of teaching materials
- programs for the instructor who makes an across-the-board assessment of the students who have diagnosed themselves.

With such preparation, learning is at least feasible.

The signature of the module training system lies in the fact that it is a training method systematized on the basis of acknowledged learning principles.

MODULE TRAINING SYSTEM

Module training in Japan is defined according to the following parameters.

- In carrying out occupational capability redevelopment training, due consideration is given to the skills already possessed by the trainees and their learning ability.
- In order to provide them with levels of skills appropriate to actual places of employment, skills and knowledge required for given lines of occupation are divided into basic module units (MU).
- The training system is adapted to the attainment of a prescribed level of skill for each module unit.
- The time of admission is varied and the reemployment of those who are unemployed or who are to shift to another job is encouraged.

The courses of module training are designated by the Human Resources Development Bureau. The 27 training courses so designated are indicated in Table 1.

The training period is set at six months (800 hours) with module training as a genre of the occupational capability redevelopment training.

The training is done with an integration of practical training and lectures, and the curriculum guidelines are determined by the Human Resources Development Bureau.

Curriculum Guidelines

The highlights are as follows:

- the skills (including the related knowledge) are divided into basic work units and are designated as module units; and
- the basic work unit, as referred to here, is a task in terms of standards.

However, depending on the ease with which jobs may actually be accomplished, there are cases in which a somewhat liberal group of module units is prepared (e.g. the piling of gate pole blocks in architectural block-laying work). For the convenience of training, there are cases in which factors in a task are made units (e.g. the placing of beads in welding work).

Table 1: Designated Module Training Courses

Welding	Machining (Lathe)	Sales	Plastering
Sheet Metal Work	Machining (Milling Machine)	Accounting	Steel Work
Plumbing	Machining (Finishing)	Tracing	Building Sanitary Management
Sewing	Die Making	Plate Making and Printing	House Maintenance
Landscape Gardening	Housekeeping	Electronic Equipment Repairing	Office Work
Painting	Tiling	Electric Equipment Repairing	Interior Service
Architectural Block Laying	Woodworking	Home Electric Appliance Repairing	Building Equipment Maintenance
		Electric Wiring	

Particularly for welding, sheet metal work and plumbing courses, the following items are made units:

- factor work, with consideration given to interchangeability between types of jobs; and
- tasks for skills application.

For each module unit, the necessary range of skills, the level of attainment and the particulars of training are specified.

The guidelines have the following features:

- The skills and knowledge required for a given type of job are divided into basic module units, and a curriculum is prepared for each.
- A module unit covers a whole range of skills and knowledge required for a job type.
- The "particulars of the training" take the form of an integration

of practical training and lectures, centering on practical exercises.

- The "practical exercises" are described according to the sequence of work.
- The degree to which a skill is attained at the completion of a module unit is assessed in a test, and arrangements are made for trainees to proceed to the next phase of learning.

Each module unit serves as a unit of training. When the training is to be conducted, the module units are tied in with employment in response to the needs of a given area and are selected at each training facility. With due consideration given to the order of the training, a training course is organized.

Table 2 indicates the number of module units for each training course. As an example, Table 3 indicates the types of module units for the welding, sheet metal work and plumbing courses.

Table 2: Number of Module Units by Training Course

Course	Number of MUs	Course	Number of MUs
Welding	*1	Accounting	*1
Sheet Metal	153	Office Work	*2
Plumbing			75
Sewing	33	Tracing	27
Landscape Gardening	61	Plate Making and Printing	33
Painting	32	Electronic Equipment	
Architectural Block Laying	36	Electronic Equipment	*1
Machining		Home Electric Appliance Repairing	*2
(Lathe)	*1		141
(Milling Machine)	*2	Electric Wiring	
(Finishing)	102	Plastering	21
Die Making		Steel Work	73
Housekeeping	23	Building Sanitary Management	*1
Tiling	24		*2
Woodworking	27	Building Equipment Maintenance	63
Sale	23	House Maintenance	68
		Interior Service	65

*1 MUs are formulated with an integration of two to four courses. MUs may be selected, depending on employability and the necessity of education.

*2 The yardstick for the selection of MUs for each training course is indicated by "the procedure" for the given training course.

Table 3: Types of Module Units for Welding Sheet Metal Work and Plumbing Courses

MU No.	MU Subject	MU No.	MU Subject	MU No.	MU Subject
1	Fundamental measurement of length	30	AC arc flat I butt welding (thin sheet)	54	CO_2 arc vertical fillet weld (middle sheet)
2	Fundamental measurement of angle	31	AC arc flat V butt welding (middle sheet-with backing)	55	Handling of TIG welder
3	Measurement of level	32	AC arc flat V butt welding (middle sheet-without backing)	56	TIG flat bead placing (aluminum thin sheet)
4	Marking-off on plane	33	AC arc vertical bead placing	57	TIG flat I butt welding (aluminum thin sheet)
5	Scraping of steel	34	AC arc vertical I butt welding (thin sheet)	58	TIG horizontal level fillet weld (aluminum thin sheet)
6	Scrapping of concrete	35	AC arc vertical V butt welding (middle sheet-with backing)	59	TIG flat bead placing (stainless thin sheet)
7	Filing of plane (Basic)	36	AC arc vertical V butt welding (middle sheet-without backing)	60	TIG flat I butt welding (stainless thin sheet)
8	Filing of parallel plane (Basic)	37	AC arc vertical fillet weld (middle sheet)	61	TIG horizontal level fillet weld (stainless thin sheet)
9	Filing of right-angled plane (Basic)	38	AC arc horizontal bead placing (middle sheet-without backing)	62	Handling of MIG welder
10	Filing of curved plane (Basic)	39	AC arc horizontal V butt welding (thick sheet-with backing)	63	MIG flat bead placing (aluminum middle sheet)
11	Cutting by hacksaw	40	AC arc horizontal V butt welding (thick sheet-without backing)	64	MIG flat V butt welding (aluminum middle sheet)
12	Thread cutting by tap	41	AC arc horizontal level fillet weld (middle sheet)	65	MIG flat bead placing (stainless middle sheet)
13	Thread cutting by dies	42	AC arc overhead bead placing	66	MIG flat V butt welding (stainless middle sheet)

14 Handling of gas welder

15 Gas flat bead placing

16 Gas flat I butt welding (thin sheet)
17 Gas horizontal level fillet weld

18 Gas vertical bead placing
19 Gas vertical I butt welding (thin sheet)
20 Gas flat bead placing for cast iron

21 Gas flat V butt welding for cast iron

22 Gas flat butt welding for steel pipe

23 Gas horizontal level butt welding for steel pipe
24 Automatic gas cutting

25 Manual gas cutting
26 Soldering
27 Hard soldering
28 Handling of AC arc welder
29 AC arc flat bead placing

43 AC arc overhead V butt welding (thick sheet-with backing)
44 AC arc overhead V butt welding (middle sheet-with backing)
45 AC arc overhead fillet weld (middle sheet)
46 AC arc welding for fixed pipe (middle sheet)
47 Handling of CO_2 arc welder
48 CO_2 arc flat bead placing

49 CO_2 arc flat I butt welding (thin sheet)
50 CO_2 arc flat V butt welding (middle sheet-without backing)
51 CO_2 arc horizontal level fillet weld (middle sheet)
52 CO_2 arc vertical bead placing

53 CO_2 arc vertical V butt welding (middle sheet-without backing)

67 Spot welding

68 Grinding with angle grinder

69 Grinding with double head grinder

70 Hole making with bench boring machine
71 Hole making with electric drill
72 Material cutting with high speed grinder
73 Plane cutting with shaper

75
Sheet metal working's MUs
103

105
Piping's MUs
151

152 Manufacturing of box type vessel
153 Welding of structural steel

Module Units of ILO

According to the *MES: Principles and Practices*,[1] issued by the International Labour Organisation (ILO) in 1977, the module units are tasks or groups of tasks that satisfy the following conditions:

- The units are self-replenishing and self-completing. (There is a necessary and sufficient substance of learning in a given unit and it exists independently from other units.)
- Each task in the job is clearly indicated.
- Learning is significantly quantified.
- The level of attainment is measured at the completion of training.
- A sense of completion may be entertained about a specific target, and it may be sensed that a step forward has been made toward the acquisition of qualifications which are tied in with the work.

Module units initially meant "functions" according to the *Introduction of a Vocational Training System Using Modules of Employable Skill*[2] issued by the ILO in 1973, and could be schematized as follows:

Occupation Job Function Task Operation Skill
MU

In the *MES: Principles and Practices* issued by the ILO in 1977, the concept of "function" is deleted, and "task" and "group of task factors" are taken up as MUs, as indicated below:

Occupation Job Task Task Factor Skill
MU = Group of task factors

The later revision does not necessarily signify a narrowing of the scope of skill from "function" to "task", but an expansion of the scope of tasks. The fact that even the group of task factors is taken up as a module unit means that there is a broad range of units, large and small. This is evident from the following example given in the *MES: Principles and Practices* and shown in Table 4.

The training sequence of module units is determined independently by the training facility, taking into account the needs of efficiency and interconnectedness.

The target and content of training are determined for each unit, as

Table 4: Changes in ILO's MUs

MUs in 1973	MUs in 1979
Disassembling and assembling of engines (function)	Removal of engines (task) Disassembling of engines (task) Assembling of engines (task) Mounting of engines (task)
Maintenance of tires (function)	Maintenance of tires (task)

indicated in Table 5. What trainees will be able to do as a result of training is described in concrete terms. The number of hours required to attain a level of skill is variable, depending on the ability of each trainee.

The substance of the training required for the accomplishment of a target is specified by practice, knowledge (related knowledge, applied computation, safety and hygiene, and blueprint reading) and selective test items. The practice is described from preparations for the start of work to cleaning after the work. The necessary minimum knowledge is described for each step of the practice. Knowledge and practice are tied in with each other in conducting the training at 63 per cent of all training facilities. A test is conducted at the completion of each unit to see if the training target has been accomplished.

At the Research and Development Institute of Vocational Training, a textbook is prepared for each unit on the basis of the scope of skill, level of attainment and particulars of the training. The textbooks contain training subjects and assessment tests.

Use of Guidelines

The skills and knowledge to be imparted in the welding, sheet metal work, and plumbing courses are divided into module units, and the scope of skill, level of attainment, and the training content are specified.

The most important practice for a given module unit is prescribed. Full care is exercised in providing guidance, so that each task is efficiently accomplished with the correct work method and due attention is paid to safety factors.

The guidelines prescribed the minimum knowledge associated with the practice of a given module unit according to the following classification:

- The trainees must have the *basic knowledge*. Guidance must be provided so that trainees are able to have an accurate understanding and put it to practical use.

Table 5: Target and Content of Training

Practice	Related Knowledge		Applied Computation	Safety and Hygiene	Blue Print Head	Ascertaining Test
	Basic Knowledge	Additional Knowledge				
1. Preparations for work						(1) Gas welding tools may be correctly handled with a knowledge of the method to handle them.
(1) Clothing, attitude and mental attitude				(1) Gas welding and safety and hygiene		
(2) Wearing of protective gear				(1) Protective gear and safety and hygiene		
(3) Ascertainment of the quality of parent metal	(1) Structure and handling of gas welding work tables (1) Types and handling of gas welding tools	(1) Welding deficiency due to the deficiency of parent metal (2) Carbon steel and gas welding			(1) Symbols of steel material	(2) Parent metal may be correctly prepared with a knowledge of the importance of its cleaning.
(4) Cleaning of parent metal	(1) Importance of the cleaning of parent metal	(1) Causes of the generation of blow holes and bits				
(5) Placing of parent metal						
2. Manipulation of welding blow pipes and welding rods						(1) The correct welding posture may be taken.
(1) Welding posture	(1) Correct welding posture					(2) Welding blow pipes and rods may be correctly manipulated.
(2) Holding of welding blow pipes	(1) Holding of welding blow pipes at the ready (2) Types and characteristics of	(1) Relations between the disaster of welding rods and the thickness of plates				(3) Gas welding rods for mild steel may be correctly manipulated with

	welding rods				knowledge of their types and characteristics.
(3) Manipulation of welding blow pipes and welding rods	(3) Selection of welding rods (1) Extraordinary fires — types, causes and countermeasures				(4) The correct measures may be taken against extraordinary fires.
3. Placing of beads (1) Connection of beads (2) Treatment of both ends		(1) Difference between string bead and wing bead (2) Composition and appellation of welding metal			(1) String beads may be correctly placed with a knowledge of each part of the bead.
4. Cleaning after the work (1) Cleaning after completion of the work	(3) Strains — causes and countermeasures (1) Purpose of treating ends				(2) Strains may be removed. (3) Beads may be correctly connected.
5. Inspection (1) Inspection of the external appearance	(1) Improper shape of beads — causes and countermeasures	(1) Non-breaking and breaking inspection		(1) Safety, such as against fire	(4) Both ends may be correctly treated with a knowledge of their purposes. (1) The improper shape of beads and their causes and countermeasures are realized.

TABLE 5 cont.

Scope of skill and level of attainment

When this MU training is completed, each trainee may be able to do the following things:
1. Preparations for parent metal may be correctly made.
2. String beads may be correctly placed.
3. The external appearance of welded parts may be checked.

Matters to be taken into account for guidance:
1. The standard period of this MU training is 30 hours or so.
2. This MU training will be provided to those who have completed training on the "MU14: Handling of Gas Welding Devices, etc."
3. In ascertaining tests on the placing of beads, the following items will be evaluated:
   (1) The width of the beads is uniform.
   (2) Melting is evenly done all the way to the backside.
   (3) There is no unevenness in melting.
4. In tests to ascertain inspections, an external-appearance inspection will be conducted on the following items:
   (1) Straight beads, uniform width, wave pattern, height, melting, etc.
   (2) Undercut, overlap, bit, cracking.

- In addition, the students should have the kind of *supplementary knowledge* required for mastery in the skill.

The guidelines also prescribe:

- The most important and fundamental types of numerical computation trainees have to know in undergoing the practical training.
- Methods for the prevention of accidents in actual work.
- The most important and basic ways of reading blueprints and work instructions.
- Assessment tests to ascertain whether the scope of skill stipulated for a given module unit has been achieved.

The hours required for the training of unskilled persons with general ability are indicated as standards. The training hours may be increased or decreased, depending on the trainees' experience in their previous job and their learning ability, as the occasion may demand.

MES AND MU

MES is the acronym for Modules of Employable Skills advocated by the ILO. MES is the combination of module units which conform to the needs of employability in a given district. Therefore MES is determined for each district training facility.

It is necessary that MES are formulated as units for the cultivation of a comprehensive ability and indicate the skills to be mastered in concrete terms. The purpose of learning each module unit should thus be clearly identified.

There is a need to work out MES, depending on the training phase. In the initial phase, MES may be formulated with a combination of module units for basic skills, whereas in an advanced course, MES employing an applied ability may be formulated. As far as possible, it is desirable to come out with more than one MES training subject. In other words, it is important to come out with those which are in line with the abilities of trainees, such as subjects classified according to the degree of difficulty and subjects formulated according to the difference of module units.

In addition, it is possible to formulate MES for each specialized sector in each training course. Cases in point are building painting and metal painting in the painting course, and gas welding, alternate-current arc welding and carbonic acid gas arc welding.

When training is to be done according to MES for each training course, it is desirable that training subjects and test questions be prepared.

For reference purposes, the ILO definition of MES is as follows:

- MES is not a mere collection of MUs but a unit of complete skill with their integration.
- MES should include a skill attainment test of its own.
- The necessary conditions for each MU have necessary conditions for MES.
- There exists a wide variety of conditions for employment and training. In the same vein, MES also comes in various types.

MES is designed and assigned to trainees, with due consideration given to each trainee's motivation and other characteristics.

CERTIFICATION

The module unit certificates certify the skill mastered in each unit for the sake of employment. They also clarify the trainees' readiness to learn other units that have to be learned in future as the occasion demands. The certificate is valid at a broad range of training centers.

The certificate is issued by the chief of each training facility, after a trainee has passed the necessary assessment test.

This certification is issued separately from a certificate issued for the completion of a course. For example, the latter certificate is issued, when the occasion demands, in a situation where a trainee is to have access to a job even without a certificate for the completion of his course (caused perhaps by a shortage of time).

This is an example of the fact that module training is different from the conventional system of training which is completed with the termination of the training period. Module training comes to an end only with the attainment of the prescribed skill level.

MODULE TRAINING MATERIALS

Module training is adaptable to individual learning. Its premise is that each trainee steps up his or her learning activity in a positive manner while ascertaining the degree to which he or she has learned the skill. If the occasion demands, units may be added at the request of trainees in addition to the program formulated by the training facility.

There is thus a need to prepare teaching materials so that the trainees may independently study for each unit.

Hence it has been made a rule for each training facility to prepare teaching materials which will enable the trainees to learn by themselves and subject the materials to the approval of the Ministry of Labor. Such approved materials consist of textbooks and audiovisual teaching aids prepared for each unit.

The authorized teaching materials must satisfy the scope and attainment level of skill for each unit. Skill is learned through actual work in the training; in such work, arrangements are made so that trainees can acquaint themselves with the needed knowledge and theories.

The textbooks authorized by the Ministry of Labor consist of training content sheets, work instructions, auxiliary sheets, and assessment test sheet.

The training content sheet clearly indicates what should be learned and how the work instructions indicate the precise sequence of actions to be taken for learning. These include the following:

- In the column "Practical Learning", standard methods are indicated. For a situation where a different work method is used due to the unavailability of standard tools or other factors, the work method is indicated in the column "Things Desirable to Know".
- In the column "Things Desirable to Know", the knowledge needed to carry out the practical work more safely and accurately is described.

The auxiliary sheet provides incidental knowledge which is required to develop module skills to broader ones.

Table 6 indicates the manner of developing training materials for module units.

Table 6: Development of Training Materials

Planning	Discussion with Minister of Labor, questionnaire survey, etc.
V	
Programming	Discussion on broad guideline, scheduling
V	

cont. on p. 186

TABLE 6 cont.

Appointment of Working Committee	Members selected from experienced people in training institutions and industry
V	
Committee Meeting	Working schedule, drafting assignment, coordinating between writers
V	
Internal Check	Examination of the draft material by the inspector
V	
Application for Authorization	To the Minister of Labor
V	
Authorization	By the Minister of Labor
V	
Contract with the publisher	Public tender
V	
Printing	Proofreading
V	
Publication and Distribution	

NOTES

1 Ishikawa, Toshio and Setsuo Yasue, "ILO's Module Training", *Kunken News*, No. 15, 1981.
2 Munakata, Motosuke, "On ILO's Module Training System", *Gino to Gijitsu*, No. 6, 1975.

Developing A Curriculum

Jamal-Ud Din

The DACUM (Developing A Curriculum) approach to occupational analysis is gaining acceptance in Asian and Pacific countries.

The DACUM approach to the development of curricula was created initially in a joint effort by the Experimental Projects Branch, Department of Manpower and Immigration of Canada and the General Learning Corporation of New York.

Following early successes at New Start, Inc. in Nova Scotia, Canada, DACUM was adopted by Holland College in 1969 as a basis for developing all of their educational programs. Today, DACUM is being widely used by many training institutions and postsecondary colleges throughout Canada and the United States.

The National Center for Research and Vocational Education (NCRVE), Ohio State University conducted a DACUM on DACUM in October 1982. It was that occupational analysis that provided the research base for the formal development of the DACUM facilitators' guidelines and training program.

DACUM was first introduced at the Fourth Technical Committee meeting of Asian and Pacific Skill Development Programme (APSDEP) in New Delhi, India in October 1982 by Dr. R. E. Norton of the National Center for Research in Vocational Education, Ohio State University, USA.

DACUM is a relatively new and innovative approach to occupational analysis. It has proven to be a very effective method of quickly determining, at relatively low cost, the tasks that must be performed by persons employed in a given job or occupational area.

The profile chart that results from the DACUM analysis is a detailed and graphic portrayal of the duties and tasks involved in the occupation or job being studied. The DACUM analysis can be used as a basis of: (1) curriculum development; (2) student counseling and recruitment; (3) training needs assessments; (4) worker performance evaluations; (5) competency test development; and (6) job descriptions.

DACUM has been successfully used to analyze occupations at the professional, technical, skilled and semiskilled levels. DACUM operates on the following three premises:

- *Expert workers* are better able to describe/define their jobs than anyone else.
- Any job can be effectively and sufficiently described in terms of the *tasks* that *successful* workers in that occupation perform.
- All tasks have direct implications for the knowledge and *attitudes* that workers must have in order to perform the tasks correctly.

A carefully chosen group of eight to twelve expert workers from the occupational area under consideration form the DACUM committee. Committee members are recruited directly from business, industry or the professions. The committee works under the guidance of a facilitator for two or three days to develop the DACUM chart. Modified small-group brainstorming techniques are used to obtain the collective expertise and consensus of the committee.

Because of their current occupational expertise, committee participants do not need any advance preparation. Almost without exception, participants on DACUM committees have found the activity to be a professionally stimulating and rewarding experience.

The DACUM committee is carefully guided by the facilitator through each of the following steps:

- Orient committee to DACUM;
- Review job or occupational area of concern;
- Identify the general areas of responsibility (duties);
- Identify the specific tasks performed in each duty area;
- Review and refine task and duty statements;
- Sequence task and duty statements;
- Identify entry-level tasks; and
- Other options, as desired.

The DACUM process usually results in the identification of 8 to 12 duties, and 50 to 200 task statements that outline *what* a successful worker in a particular job or cluster of related jobs must be able to do. These tasks are then commonly submitted to a larger but still select group of workers and immediate supervisors of such workers for verification purposes.

The tasks that are verified as important become the research base for developing modules or other units of instruction for the educational program. During the instructional development phase that follows the DACUM process, the verified tasks undergo a *task analysis* to determine the specific skills, knowledge and attitudes the worker needs to perform each task. The information resulting from the task analysis is then incorporated into modules, learning guides, or other types of instructional materials for student and teacher use.

Recognizing the advantages of DACUM, the APSDEP Technical Committee gave formal approval to the introduction of the process in the Asia-Pacific region. Accordingly, the APSDEP Adviser on Trainer Training underwent specialized training at NCRVE, Ohio in 1984, and qualified as a DACUM Coordinator and Facilitator authorized to conduct workshops.

Launched in January 1985, this new service of APSDEP is gaining popularity with many training institutions in their efforts at curriculum development. The tendency in the past has been to provide a course structure to suit mainly the convenience of the staff and to fit the resources available. In many cases, this approach has proved to be divorced from the realities and needs of industry.

Consequently, an increasing number of technical and vocational training institutions are realizing the need to provide practical, up-to-date and relevant curricula that will offer a wide range of employment opportunities.

One of DACUM's features which impressed institutes is its speed and effectiveness in determining, at a relatively low cost, the tasks that must be performed by persons in a given job or occupation.

Since the beginning of 1985, APSDEP has received eighteen requests for DACUM workshops. However, due to staffing and financial constraints, APSDEP was able to conduct thirteen. These were in Burma, Fiji, Hong Kong, Japan, Korea, Nepal, Pakistan and Thailand.

The first workshop in April 1985 was at the Provincial Technical Training Centre in Peshawar at the request of the National Training Bureau of the Ministry of Labor, Pakistan. Fifteen participants and six observers analyzed the occupation of a bench fitter. A total of eight duties and 67 competencies were identified. During the three-day workshop, there were lively, at times heated, discussions on competencies to be included in the curriculum. Although English was the medium of the workshop, on controversial issues participants resorted to local languages (Urdu and Pushto) to thresh out points and arrive at consensus. The workshop provided a unique opportunity for the participants, who were senior technical teachers drawn from all the provinces of Pakistan, to exchange experiences and methods in curriculum development.

In succeeding workshops conducted in seven countries, a wide range of occupational areas was analyzed. The occupations included those of training officer, motor vehicle mechanic, director of a technical college, lecturer of an educational technology department, lathe operator, machine turner, and vocational training administrator.

Analyzing the sedentary type of occupations is usually a smooth process. However, technical occupations such as motor vehicle mechanic, lathe operator and machine turner always generate a great deal of discussion. This is due mainly to the fact that some participants have highly advanced knowledge of the job while others are handicapped by a basic and sometimes outdated knowledge. Through modified small-group brainstorming techniques, a consensus and a balance are achieved. Therefore, in some instances, a profile chart is developed with flexibility to cater to the skills of both a specialist and a generalist.

The DACUM Workshop was structured into the program of a two-week seminar on the training of instructor trainers held in Chiba, Japan. Using the DACUM approach, 15 participants from the Pacific (Australia, Fiji, Japan, Kiribati, Tonga, Vanuatu and Western Samoa) analyzed the job of a training officer. Although different ethnic and cultural factors influenced the level and scope of the job in the countries concerned, a high proportion of similarities was identified.

The DACUM Workshop organized by the Public Service Commission of the Fiji Government attracted 22 participants from as many departments and ministries. The participants were middle-level civil servants holding various job titles but performing mainly the duties of training officers. Over three days, they identified 12 major duty areas and 143 tasks being performed by government training officers. The analysis provided an eye-opener for both the officers concerned and their respective departments; perhaps, it was the first time everyone realized the broad and complex nature of the job of a training officer.

Individual reactions to DACUM as a process for identifying tasks important to vocational and educational instruction have been mostly favorable. Participants have commented on its practical and time-saving nature and some have recommended its larger adoption. However, many participants felt that the time was inadequate and suggestions were made to increase the duration of the workshop to three or four weeks. There were also requests for the workshop to be conducted in local languages. This perhaps signifies the need to organize a DACUM trainer workshop to train locals in the DACUM process. APSDEP is aware of such a need and hopes to organize a DACUM trainer course in 1987 or 1988.

In Korea, the Department of Labor and the Vocational Training Research Institute had many workshop handouts and transparencies translated into Korean and distributed to panel members in advance. This proved worthwhile because the participants displayed a far greater understanding of DACUM philosophy and principles during the workshop.

Again, reflecting the culture and traditions of the countries concerned, some workshops generated lively debates on certain issues and it became difficult to arrive at a consensus because of the diversity of experience, while in others, participants from some countries, because of their nature and customs, easily and quickly agreed with one another's points of view.

Some institutions, such as the Ayuttaya Technical College (Thailand) and the Vocational Training Research Institute (Korea), have translated the English version of the emerging DACUM occupational profiles into local languages and these have been widely disseminated.

The DACUM approach to curriculum development has been found most suited to institutions like the Hong Kong Technical Teachers College and the Faculty of Engineering Technology, Bangkok, which are implementing competency-based education/training. The specific competencies identified through DACUM provide a framework for the instructional program.

In Pakistan, the National Training Bureau is using DACUM to update and structure a more relevant and industry-oriented curriculum that will meet the needs of the country. This approach further conforms to the standards set by the World Bank which is providing a substantial loan to Pakistan for the development of vocational training programs.

Many countries are realizing the problems of imbalances of skills caused by indifferent educational and training programs offered by training institutions. Particularly in Asia, there are thousands of educated unemployed people. Ironically, the same countries are experiencing shortages of skills, particularly in the construction, technical, professional and managerial fields. Hence, the growing desire of progressive institutions of learning to establish relevant and up-to-date curricula for instructional programs. What is needed is a sound curriculum, with maximum input from business and industry that is going to employ the trainees prepared by vocational and technical training institutions.

The DACUM approach to curriculum development has already provided a basis for several effective training programs. Given its popularity and effectiveness, DACUM is likely to become a leading approach to occupational analysis for technical and vocational training.

Competency-Based Education and Training

Robert E. Norton

When teachers and administrators are asked to consider changing their instructional programs from the conventional lecture-discussion approach to the competency-based education (CBE) approach, they logically ask, "Why, is it really better?" Many have concluded that it is indeed better because it permits more students to reach a higher level of attainment and it is especially suitable for the needs of students who have not experienced success in regular programs. For example, the National Academy of Sciences stated in a 1983 report, "Unions, educators and employers should work to change the requirements for the completion of cooperative education and apprenticeship programs; they should be based on competence rather than time." Dr. Daniel Lyons, Director of Training for the Goodyear Tire and Rubber Company, declared before a U.S. House of Representatives subcommittee, "We believe that the critical, central issue in apprenticeship training is that the wasteful, medieval concept of *time-based* training must be discarded in favor of *competency-based* training."

To understand what CBE (occasionally referred to also as PBE, Performance Based Education) really involves, we will look closely at the following four major subtopics.

- Defining competency-based education and training
- Identifying training program needs
- Developing the curriculum
- Developing competency-based instructional materials

Defining Competency-Based Education

To comprehend fully the meaning of CBE, one must be aware of the essential elements and desirable characteristics of such programs. There are five *essential elements*:

- *Competencies to be achieved are carefully identified, verified and made public in advance.* This simply means that the important entry-level competencies for any occupational program area must be identified in some appropriate manner, verified as relevant by experts who know that field, and then made known to students and others interested in what the program is designed to teach.
- *Criteria to be used in assessing achievement and the conditions under which achievement will be assessed are explicitly stated and made public in advance.* This means we eliminate guessing games about what parts of the course are important and tell students exactly how their performance will be evaluated. We

must discard the traditional norm-referenced approach to the evaluation of student achievement in which the focus is on comparing a student's progress with that of other students. In its place, we adopt the criterion-referenced approach in which each individual student's progress is compared with previously established criteria that are made known to all.

- *The instructional program provides for the individual development and evaluation of each of the competencies specified.* Each student will be given the opportunity to develop each of the competencies important to his/her training program and to demonstrate attainment of each. This essential element has strong implications regarding the need to individualize CBE programs to the maximum extent possible and for the type of instructional materials needed to make individualization possible.
- *Assessment of competency takes the students' knowledge and attitudes into account but requires actual performance of the competency as the primary source of evidence.* CBE goes beyond the traditional educational expectation that students should *know* the "how" and "why" of things and places a strong emphasis on the "ability to do" as well. Of course, in order to perform a task correctly, the student will need to acquire the necessary knowledge and attitudes.

  Acquiring the prerequisite knowledge and attitudes does not by itself ensure the student's actual ability to perform important competencies. It is with regard to this essential element of CBE that many programs fall short, relying instead only upon paper-and-pencil tests of cognitive understanding as proof of competency. While such measures can appropriately be used to assess prerequisite knowledge, they must be supplemented by performance-oriented tests, process-and-product checklists, or other measurement devices that permit assessment of the student's actual ability to perform the expected competencies.
- *Students progress through the instructional program at their own rate by demonstrating the attainment of specified competencies.* The object is to make time the variable and learning the constant. Again, it is clear that some individualization of instruction is called for. While student progress is dependent upon the demonstration of competencies, this element does not mean that reasonable time limits cannot be imposed upon the students. Some may misinterpret this element to mean that only the

students are accountable for their progress. Not so, a CBE program places accountability for learning squarely upon the shoulders of both the learner and the instructor.

In addition to the five essential elements of CBE programs, there are a number of facilitating characteristics. These can be grouped into instructional characteristics and administrative characteristics. These facilitating characteristics help bring the potential of CBE into full reality. They allow students to learn efficiently and instructors to teach effectively, and make vocational education more rational and relevant than ever. A vocational-technical program is considered to be fully competency-based when it exhibits *most* of the characteristics listed in the following two facilitating categories.

Facilitating Instructional Characteristics

The instruction is designed to include the following instructional elements:

- The instructional materials are used (e.g. learning guides or modules) appropriately.
- Environments that duplicate or simulate the workplace are available to students during competency development.
- Basic knowledge or background theory is learned as it is needed to support competency development.
- Students are informed about the traits and attitudes important to workers in the occupation and are periodically evaluated regarding their attainment.
- Each student is given continual and detailed feedback on competency development.
- A variety of learning styles and teaching strategies are provided for.
- Students with appropriate prerequisite skills and knowledge may bypass instruction on competencies already attained.

Facilitating Administrative Characteristics

The program is organized and supported administratively to include the following elements:

- Program completion is based on satisfactory achievement of all specified competencies.
- Students can enter and exit from the program at different times.

- Individual student records are maintained and reflect student progress at any given point in time.
- Materials, space and equipment are available when needed by students and instructors.
- The record-keeping system permits students' transfer into and out of the program without requiring duplication of instruction on competencies already achieved.
- The requirement of a designated number of hours of instruction is removed from the criteria for program completion.
- Records of competency attainment are provided to students and prospective employers.
- Student grades, if used, reflect the level of competency attained.
- Credit, if awarded, is given for competencies achieved as a result of instruction and for demonstration of previously acquired competencies.
- Student fees are individually assessed and are based on the time actually spent in the program and the instructional resources used.

When we add the facilitating characteristics of CBE to the five essential elements, the graphic presentation looks like the one in Figure 1.

Thus, the facilitating characteristics support and enhance the potential inherent in the whole CBE process. While the five essential elements must be established with all due rigor and without compromise, it is in the facilitating characteristics that program individuality and adaptability come in. The logic of the facilitating characteristics is so clear that most vocational administrators and instructors can accept them in principle without difficulty.

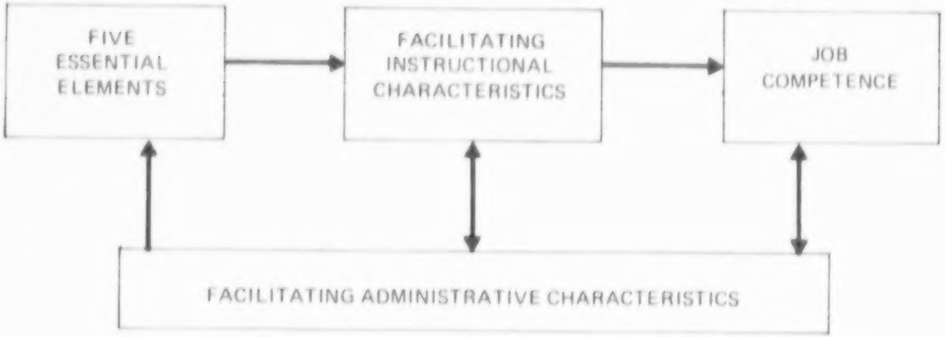
For a graphic illustration of what CBE means to the student functioning in such a program, see Appendix A. Another model illustrating how a student may enter, exit and re-enter a CBE program is illustrated by Appendix B. When implementing CBE, considerations must be given to modifying the traditional instructional and administrative processes so as to facilitate the movement of students through this type of learning and evaluation sequence.

Advantages of CBE

The underlying concepts of CBE are considered by many to be extensions and elaborations of the mastery learning concept proposed by John Carroll[1] in the 1960s and Benjamin Bloom[2] in the early 1970s.

Figure 1

ESSENTIAL ELEMENTS AND FACILITATING CHARACTERISTICS


FIVE ESSENTIAL ELEMENTS
FACILITATING INSTRUCTIONAL CHARACTERISTICS
JOB COMPETENCE
FACILITATING ADMINISTRATIVE CHARACTERISTICS

Their thinking is substantiated by research results that show that, given favorable learning conditions, *most people can learn almost anything*. If this seems farfetched, consider the automobile, a fearsome, powerful, complex machine, which millions learn to drive at high speed, though some of them may not have learned even how to read or write. The difference is that in learning to drive they had motivation and favorable learning conditions.

When you accept that most people can learn, then it is difficult to be satisfied with the "normal curve" of instruction in which a certain percentage of students are expected to fail or do poorly. Instead, you teach for success and expect every student to achieve each required skill before moving on to the next one. To be sure that competency is achieved, you change the learning conditions if necessary; you do not eliminate skills or try to change the students.

The traditional view of learning is that there are good learners and poor learners. In this view, the individual's ability to learn is considered to be a rather permanent trait, and a student's position on the normal curve is expected to remain fairly constant throughout school. Based on this traditional view, the important task of a school or college would be to teach those that can learn and weed out those that cannot.

A more recent idea is that there are faster learners and slower learners. Much educational effort has been expanded to provide slower learners with the extra time and special help they need in order to achieve. Individualization of instruction and extended laboratory time are examples of the ways instructors have sought to meet the needs of slower and more rapid learners. It has become evident that slower learners can ultimately meet the same criteria as faster learners, and they seem to be able to learn equally complex and abstract ideas – if given the necessary time to do so.

Bloom's recent research has led us to the view that, given favorable learning conditions, 95 per cent of the population can learn almost anything. In addition, the mastery learning principle contends that most students become very similar with regard to learning ability when provided with favorable learning conditions. The term *favorable learning conditions* is, of course, the crucial element. It may include extra time, additional instruction, a variety of instructional media, or field-based learning experiences, among other things.

This means that educational institutions should provide for a variety of student learning styles and rates, that students should demonstrate competence in one skill before moving on to another, and that instructors must be able to deal with students as individual learners rather than as members of a large group. It also implies that the subject

Table 1: CBE Benefits

Student

- The learner will achieve competencies required for employment.
- Learners progress at their best pace to achieve occupational skills.
- A wide range of abilities can be accommodated within a program.
- The learner builds own confidence by succeeding in learning.
- The presentation options are available to all students.
- The learner is presented with a transcript of the competencies achieved.

Teacher/Instructor

- Time is used more effectively as a manager of the learning process rather than a "provider of information".
- More time is spent working with students individually and in small groups.
- Less time is required to prepare and make lectures.
- Less time is required to develop and grade paper-and-pencil tests.
- More time is spent evaluating students' ability to perform essential occupational skills.

Administrator

- Instructional staff can be used more efficiently.
- Building and instructional equipment can be used more efficiently.
- Placement of graduates in jobs is assisted.
- Students with a wide range of entry-level skills, including the handicapped, can be accepted.
- Formulating secondary, postsecondary and part-time adult instructional programs is easier.
- Seeing students achieve their goals is more satisfying.
- Greater support is lent to training programs by business, labor and industry.

Business, Labor and Industry

- There is optimum involvement in the identification of competencies to be learned by the student.
- Industry experts are more substantively involved in establishing performance criteria.
- Potential employees trained in the skills required on the job become available.
- Industry develops more trusting and collaborative relationships with schools/colleges.

matter must be carefully identified and organized. In short, it leads to competency-based education. A brief summary of how CBE can benefit the major participants and the community – student, teacher, administrator, business, industry and labor – is shown in Table 1.

There are also significant benefits associated with CBE in the area of educational administration and management. These benefits are virtually automatic when you install this approach. Among the most important are the following:

- Students with a wide range of entering skills can be accommodated.
- Facilities and work stations can be used more fully.
- Program completers can be placed in jobs more readily because they enter the job market all through the year.
- The business community is substantively involved in the institution's programs, because they are participants in the competency identification process.
- New programs can be readily set up; existing programs can be easily revised and kept current.
- The instructional staff can be used more effectively because they have more time to work with individuals and small groups of students.
- Capital outlay funds can be used more efficiently because it is not necessary to have so many duplicate tools and equipment.
- Students with special/exceptional needs can be accommodated into regular vocational programs by selecting competencies according to their specific needs and abilities.
- Part-time instructors can be used efficiently when the CBE program and materials are in place.
- Program continuity can be maintained even as staff members change.

Related to the management benefits of CBE are the educational benefits to students. Among the most important educational benefits are the following:

- Learners can progress through the program at their best rate.
- Students can learn using their preferred learning style.
- More learners achieve competence than in conventional training programs.
- Learners with little previous educational success build their self-confidence and self-reliance by succeeding in a CBE program.
- Students learn to cooperate rather than compete for grades.

Implementation Requires Training and Resources

That *CBE will probably cost more to establish and operate* is probably best described as an honest misconception. There is no doubt that it will cost money to establish a CBE program. Several types of start-up costs are involved, including the need to provide for: (1) the time of faculty and administrators involved in the program planning and development process; (2) the in-service education of all staff about all aspects of CBE curriculum, instruction and program management; and (3) the purchase or development of instructional media and printed materials. It is highly questionable, however, that these initial development costs are any more than they would be to begin any other type of new program.

As regards operational costs, there are likely to be some increased expenditures. More support staff may be needed to manage the large variety of printed and audiovisual materials used. If learning guides or other printed materials are produced in-house, this will result in the use of more paper supplies. Increased use of consumable materials in shops and laboratories is also likely because of the repeated practice required for all students to achieve competence.

However, there will also be some savings on operational costs. Probably the major savings will result from the thousands of dollars that can be saved on major equipment. In lockstep, conventional welding class, for example, most if not all the students would need to have access to arc welders at the same time – hence the need for 10 to 15 welders, which would be used only part of the year. With CBE, three welders may be enough, because class members will be learning those skills at different times as they learn at different rates or take different "paths" through the program.

One element that characterizes institutions that have successfully implemented CBE, however, is consistency. Regardless of how you decide to approach instructional delivery, it is highly recommended that the approach be common to all programs. While flexibility and creativity are still possible, some uniformity facilitates student and instructor adjustment to CBE.

Staff Orientation

When the elements of the instructional delivery system have been determined, one must initiate the crucial step of staff orientation. In-service training on each aspect of the CBE approach will be necessary. Small-group instruction and one-on-one assistance seem to be the most effective training strategies to use. If resources permit, establishing a CBE staff resource center that houses materials on CBE development and implementation is an excellent idea. Visits to CBE programs, attendance at CBE conferences, and enrollment in courses on CBE are other viable staff development options. As the long-range CBE plans are developed, funds must be allocated for staff development.

A Vocational Education Program Planning Model

The local vocational-technical program planning process is a very important and involved process. Effective planning entails the development and use of a continual source of student data, labor market data, and evaluation data, on which important program planning decisions can be based.

The educational planning process can be and has been outlined in many different ways. Any comprehensive planning process, however, may be described basically as a problem-solving activity. In vocational education, comprehensive planning involves the use of a logical and systematic procedure to answer planning questions such as the following: What are the student and labor market needs of our community or area? What programs and services should our college or school provide to meet these needs? How will we monitor the process and know whether we are achieving our goals? The result of a well-conducted comprehensive planning process should be the design, implementation and evaluation of vocational education programs that meet the identified needs and goals.

A suggested comprehensive vocational education program planning model is presented on the next page. The planning model presented, whether followed in whole or only in part, can help provide direction for organizing and conducting a planning effort that will serve to strengthen the local vocational-technical program. Some of the steps are discussed in Figure 2.

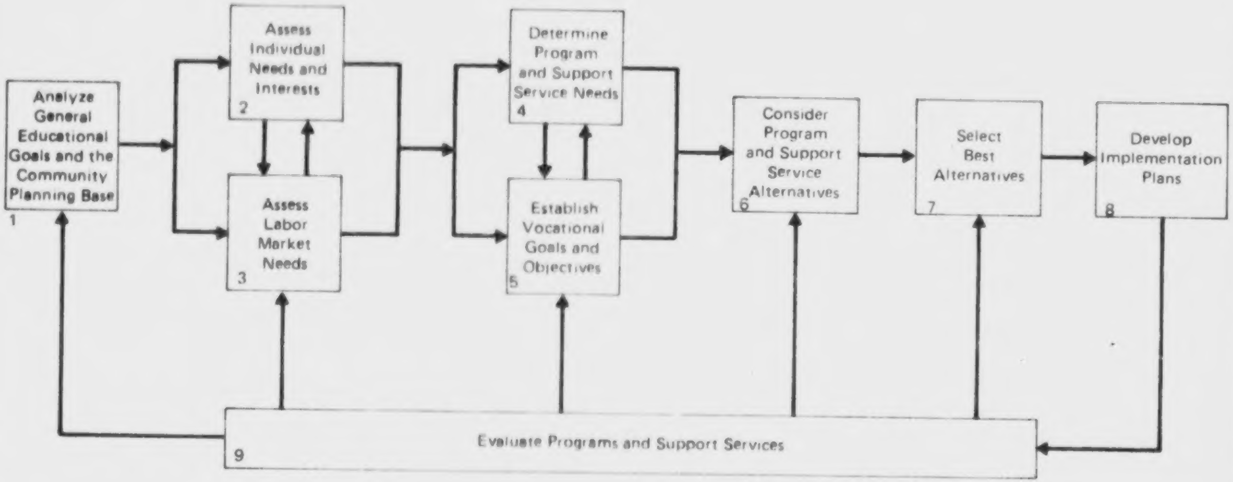
Assessing Individual Needs and Interests

When planning for the vocational programs to be offered, there is often considerable debate about whether labor market considerations or student interest should be the governing factor. Programs that are established on the basis of employment opportunities alone could potentially end up with few students enrolled. Programs established on the basis of student interests alone, on the other hand, could potentially end up training students for jobs that do not exist. The exact balance to be struck between student and labor market needs is an important issue that the vocational program planner must come to grips with. Clearly both variables need to be taken into account.

The amount of weight given to students' program interest can be increased when one also includes an analysis of student needs. Interest scores are more likely to be realistic when students have had an opportunity, through career education or vocational orientation courses, to

Figure 2

VOCATIONAL EDUCATION PROGRAM PLANNING MODEL


Analyze General Educational Goals and the Community Planning Base
1
Assess Individual Needs and Interests
2
Assess Labor Market Needs
3
Determine Program and Support Service Needs
4
Establish Vocational Goals and Objectives
5
Consider Program and Support Service Alternatives
6
Select Best Alternatives
7
Develop Implementation Plans
8
Evaluate Programs and Support Services
9

study and explore the various career clusters. It is very important to learn as much as possible about your prospective students so that the programs and support services offered are designed to be relevant to their present level of career development. Knowledge of students' aspirations, plans and expectations permits one to tailor the offerings to real needs and interests.

There are numerous methods and techniques that can be used to help assess individual needs and interests, including assessment of (1) student vocational and educational interests, (2) student needs, (3) student abilities, and (4) adult training and retraining needs.

Assessing Labor Market Needs

In the United States, state policies and federal legislation require local educational agencies to justify each instructional program for which funding is sought by showing a clear labor market need for the program. The data on employment opportunities required in the annual and long-range plans for vocational education are often derived from a variety of sources such as local employer surveys, area labor skills surveys, statewide surveys conducted by the Bureau of Labor or the state employment service, and national studies and labor market analyses prepared by the U.S. Department of Labor. In most states, the department of education works closely with the state employment service to develop and share labor market data with local vocational education planners.

Labor market data can and must be used on a continual basis by local vocational education planners. At the same time, it needs to be said that the processes used in translating labor market needs into corresponding vocational programs designed to meet those needs is *not* well developed. Those who expect a simple solution to the data analysis and translation problem – a complex process at best – will be disappointed.

The assessment of labor market needs involves assessment of both the *labor demand* and the *labor supply*. Labor demand data are used to provide an estimate of the number of individuals with particular skills who are needed or will be needed in the near future. Labor supply data provide an estimate of the number of individuals, available from all sources, who are likely to enter the labor market with particular skills. Given both an estimate of labor demand and an estimate of labor supply, one can determine the likely human resource needs that will exist.

As one develops the vocational program plans, this type of information will help you answer the following central questions: For what occupations should we be providing training? How many persons should we be training for these occupations? This type of information should indicate the potential the institution has of placing its various graduates in gainful employment.

It is vital to keep this job placement goal in mind. One needs to concentrate on the individual's need for employment as well as on the employer's need for skilled workers. Since actual job placement is probably the most important criterion in evaluating the success of existing programs, and potential job placement is probably the most important criterion in assessing the need for a new program, the importance of obtaining the best possible estimates of labor supply-and-demand data becomes obvious.

In obtaining the necessary labor supply-and-demand information for planning, the following decisions need to be made in order to determine what information will be relevant and what methods will be used in order to obtain that information:

- What is the geographic region for which labor supply-and-demand information is required?
- What occupational boundaries are relevant to the planning?

Geographic Limits of Labor Market Area. The labor market area can be defined as an area for which there is a concentration of economic or industrial activity and in which workers may change jobs without having to change their residence. This definition assumes that workers are not going to move in search of employment, or that if workers should move, they will no longer be considered as part of the area.

However, a labor market area can be a physical region much larger than that circumscribed by normal community distances. Thus, some definitions of the geographic boundaries of a labor market are affected by the willingness of labor to move from one city to another. Such definitions are usually occupationally dependent. The labor market for brain surgeons, for example, is the entire nation or larger. Nevertheless, labor movement is usually rather low within most occupations.

There are many ways of determining what labor market area would be relevant to a particular vocational planning effort. One option is to accept and use one of the several established labor market areas that are commonly used for such planning decisions.

Another way of determining the appropriate geographic boundaries for an institution is to survey former vocational students to determine how far afield they actually went in order to obtain employment. In a practical sense, the labor market area should be a region for which analysis of employment and training data is valid and for which data are available or obtainable.

Occupational Boundaries of Labor Market. The labor market also functions within occupational boundaries. In other words, the information one needs about the supply and demand for labor should be limited to information concerning the availability of and need for people with *particular* occupational skills. Since vocational planners are concerned with occupations requiring skilled and technical workers, the occupations requiring professional workers (with four or more years of college) need to be excluded.

After one has determined the geographic or labor market area to be considered and the particular occupations to be included in the planning effort, one can secure the pertinent labor market information by assembling existing information, using appropriate methods to generate new information, or both.

Labor Demand Information. Estimating labor demand information for educational planning purposes includes two tasks: the selection and use of appropriate forecasting techniques, and the assembling of existing labor market information.

While forecasting future occupational employment opportunities is far from a perfect science, the use of forecasts can help to identify the occupations most likely to provide employment for the graduates. The accuracy of labor forecasts is related to the predictability of what will happen to the general economy and to various employers, businesses and industries. Forecast data are generally more accurate at the national level and less accurate at the local level. Despite their many limitations, forecasting techniques are legitimate planning tools, especially when used by experts. A general understanding of the various common forecasting techniques can make labor market data more useful for program planners. Only the use of employer surveys is discussed here.

Employer surveys can be useful for gathering the labor market information required in annual and long-range vocational education plans. They have frequently been used to collect information pertaining to the supply of and demand for skilled labor. In such surveys, employers are frequently asked to provide their best estimates of both employment and training needs.

Data can be collected rather quickly from whatever geographic area and whatever agencies and organizations are desired. Heavy responsibility for the quality of the data supplied is placed upon the employers being surveyed. Employer surveys have the additional advantage of improving communication between the school or college and employers.

Employer surveys should be, where appropriate, used for vocational planning purposes; but, as with the other approaches, the limitations inherent in the approach should also be kept in mind. In some cases, evidence of employment opportunities collected through local employer surveys has been used to justify offering vocational programs that could not have been supported by national or state level data.

Labor Supply Information. Once the total amount of current and psojected labor demand is known by occupation, one needs to determine the supply that exists to meet the demands. The total supply can be said to consist of all persons available to fill work positions created by demand across all occupations. It includes employed and unemployed persons available to take jobs. In other words, the total supply comprises the current labor force, plus the net entry of new potential employees.

Individuals can enter the labor force or the ranks of an occupation through three primary methods. They may move into the labor market from another geographic area. They may live within the labor market area and become available for employment because they are changing occupations, have left the military, are currently unemployed, or are entering the paid labor force for the first time. They may enter the labor force upon graduating or otherwise emerging from educational programs.

A complete analysis of the supply of trained graduates involves the identification of all principal training agencies and their output of graduates by occupational areas. Agencies considered should be those offering preparatory programs for training students who will enter full-time, skilled employment upon completion of the programs. The following agencies should be included in any supply analysis: (a) public secondary and postsecondary vocational and technical schools, (b) community colleges, (c) private trade and technical schools, (d) private business schools, (e) state trade and technical schools, (f) industry-sponsored training programs, (g) government-sponsored training programs, and (h) two-year programs in four-year colleges/universities.

Entry rates for individuals differ widely from program to program and occupation to occupation. For example, graduates of medical schools enter employment in the medical field almost without exception, probably because of the extensive amount of time and money they have invested in their training. For occupations in which training is less rigorous, only a fraction of the program graduates may enter employment in the occupational area. In those occupational areas, vocational educators need to train more persons than there are job opportunities in order to meet labor demand.

Three steps should be followed in estimating future labor supplies:

- Appraise the current supply in the particular occupation.
- Estimate the total number of individuals expected to enter occupations between the planning year and the year of forecast.
- Make allowances or adjustments for expected losses through death, retirement and out-migration.

Once the annual labor supply is known, the data collected can be compared to annual labor demand data to obtain a close estimate of the unmet needs each year. These estimates can provide quantitative measures of actual training needs each year. Once the necessary information about supply and demand is collected and processed, supply-demand relationships can be determined.

Determine Program Needs. The fourth step in the comprehensive planning model – determining vocational program and support service needs – is begun after community, individual and labor needs data have been obtained. It requires that all the data obtained be summarized and displayed so that the various vocational programs and support services needed can be fully identified.

The goal of this step in the local planning process might be described as an effort to identify all the various vocational programs and support services needed to satisfy *all* the individual and labor market needs of the community or area. At this point in the process, the local administrator and other planners should think in terms of the ideal, forgetting for the moment legal, financial and other constraints that may in the end prevent achieving the ideal. Unless one first ascertains what the ideal would be, the vision of what is possible is likely to be too narrowly confined to thoughts of what has been done in the past.

This is the stage of the planning process during which imagination and creativity should be given free reign in terms of the innovative ways in which the college or school might satisfy real needs. The staff planning committee and advisory council should not confine their thinking to the conventional programs and services used to meet needs. Instead, they should explore the possibilities of new courses, new services, and modified programs.

This is also the time to remember the importance of involving those who will be affected by and responsible for implementing any proposed changes in programs. Obtaining the input of all appropriate persons can be a powerful factor in securing school and community support for any recommended changes.

Analysis and Synthesis of the Data Assembled. Before planners can dream about the new and innovative ways in which vocational needs can be met, it is necessary to summarize the data assembled in a manner that permits it to be understood, studied and used as a basis for planning recommendations. Unfortunately, there is no best procedure for analyzing and using all the data available. In fact, if one reviews what others have done in the way of comprehensive vocational education needs assessment, one will find that a wide variety of approaches, techniques, forms and instruments have been successfully used.

However, some general guidelines and procedures for processing and using such data can be offered. For the purposes of this discussion, three basic types of data will be considered: (a) community data, (b) individual needs data, and (c) labor needs data. By carefully summarizing, analyzing and interpreting these various inputs to the needs assessment phase of the planning process, one provides the basis for everything that follows in sound educational planning.

Because the needs assessment process requires data inputs from a variety of sources, it becomes imperative that some structure be given to the process. There must be a conceptual framework that illustrates all the essential elements of the process and shows how they relate to each other. An expanded version of the needs assessment phase of the vocational education program planning model is presented in Figure 3.

At a glance, it can be visualized how the various inputs in the needs assessment phase lead to an identification of the various vocational programs and support services that are needed. In simple terms, Step 4 in the planning process results in the identification and documentation of all the problems or needs that potentially could be met through appropriately designed and operated vocational or technical education programs and support services.

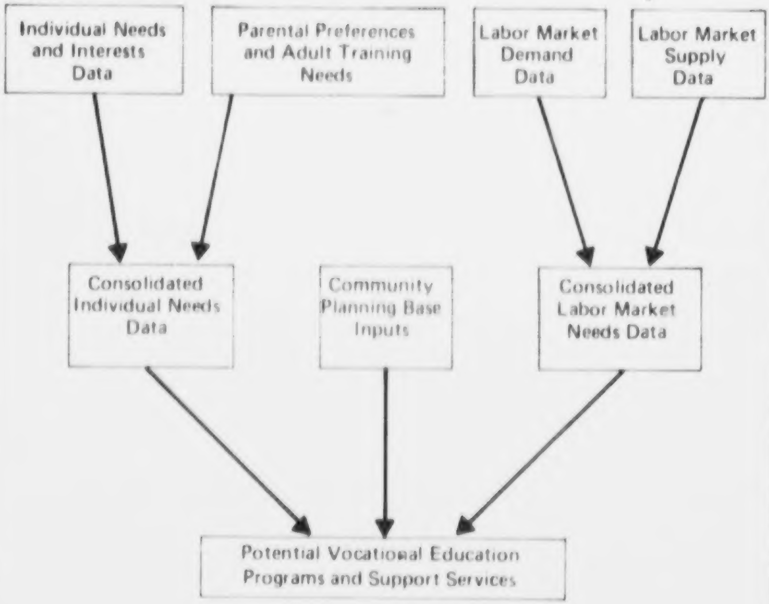
The most important factor that needs to be remembered at this point in the process is that, to be useful, the data obtained, regardless of the source, must be summarized and presented in some meaningful form so that the program planners and various decision makers will be able to understand the data and recommend program/services that can be justified on the basis of real needs.

Analysis and Synthesis of Existing Programs/Services

Before the final determination of needed vocational programs and support services can be made, it is essential to consider available information about existing programs and services. Although not an all-inclusive list, the following represent some of the major sources of information to consider in assessing needs as they relate to existing programs:

Figure 3

NEEDS ASSESSMENT PHASE


Individual Needs and Interests Data
Parental Preferences and Adult Training Needs
Labor Market Demand Data
Labor Market Supply Data
Consolidated Individual Needs Data
Community Planning Base Inputs
Consolidated Labor Market Needs Data
Potential Vocational Education Programs and Support Services

- Follow-up surveys of former students
- Surveys of present students
- Employer surveys (reactions to programs)
- Parent and/or adult surveys (reactions to programs)
- Inputs from school personnel, including vocational teachers, general education teachers, personnel services staff and administrators
- Supervisory visit reports
- Program evaluation reports
- Advisory committee recommendations

While most vocational education planning efforts will not want to collect all these types of data because of resource limits, they should all be considered. On the other hand, almost all schools and colleges will have some of the information readily available (e.g. in the form of follow-up survey data and program evaluation reports) because it is required by law. Other data, such as school personnel reactions and advisory committee recommendations are so essential to effective planning that such data must somehow be assembled and analyzed if not already available.

This type of analysis of existing programs and services should also include some assessment of other public, private, government-sponsored, and industry-sponsored training programs and services provided in the planning area. The focus of the analysis should be on what student and community needs are being met by the existing programs and services, and what needs related are yet unmet.

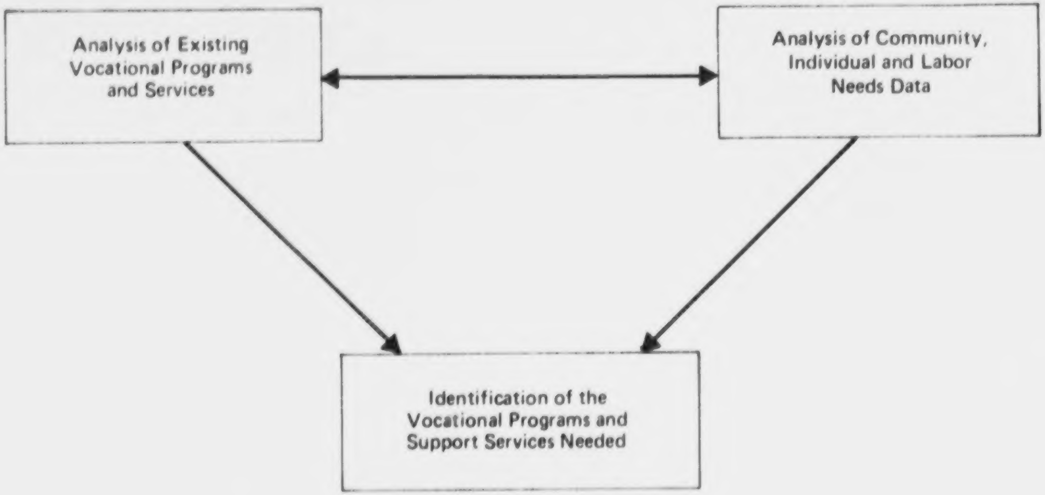
Identification of Programs and Services Needed

This activity involves the identification of the vocational programs and services needed, using (a) all the information that has been gathered about community, individual and labor needs; and (b) the data obtained from the analysis of existing programs and services. The pulling together of all the major data inputs in order to arrive at a documented list of the vocational programs and support services needed is illustrated in Figure 4.

This activity has been described by some planners as a type of "discrepancy analysis". The analysis of the community, individual and labor needs data results in a description of "what ought to be", while the analysis of existing programs and services results in a description of "what currently is". Wherever a gap exists between "what is" and "what ought to be", it may be said that another need or problem still

Figure 4

RELATIONSHIP OF MAJOR DATA INPUTS TO PROGRAM PLANNING


Analysis of Existing Vocational Programs and Services
Analysis of Community, Individual and Labor Needs Data
Identification of the Vocational Programs and Support Services Needed

exists. Once these problems or unmet needs are identified and documented, they can be prioritized and recommendations made for alleviating them. At least four types of recommendations may be the product of such problem-solving activity. These recommendations will normally include the following:

- Recommendations concerning what programs and services should be *continued*.
- Recommendations concerning what programs and services should be *modified*.
- Recommendations concerning what programs and services should be *discontinued*.
- Recommendations concerning what new programs and services should be *added*.

The identification of needs or problems should not be viewed as criticisms of the current programs and services, but as deficiencies that should help planners and decision makers plan vocational education programs that will better serve the needs of the institution's clientele.

Competency Identification

No single curricular element is more important to establishing a CBE system than the careful identification of competencies. Regardless of the instructional delivery methods used, to be competency-based a program must be based on the competencies identified by successful workers in the occupation through a valid occupational analysis process. While several valid approaches are available, one must decide which approach is most acceptable.

One approach to competency identification that should be considered *unacceptable* is allowing the teachers or instructors to identify the competencies themselves. Either occupational analyses that have been appropriately developed elsewhere should be obtained and verified locally, or local analyses involving the input of expert workers from business and industry should be conducted.

Not only must the competency identification process be valid, it must also be appropriate for local conditions and needs. Although many occupations do not differ nationally from region to region, others do, and those differences must be taken into account. While competency lists are widely available, they must be carefully reviewed to determine their applicability to local conditions. Providing for local "ownership" particularly by instructional staff and area employers, is an excellent way to ensure meaningful use of each competency list. Unless staff and local employers endorse the competencies, the competency list will likely end up as nothing more than a wall decoration.

In the United States, valid competency lists for a variety of vocational programs are available from several sources, among them the Vocational-Technical Education Consortium of States (V-TECS), the six Regional Curriculum Coordination Centers, and many state department supported curriculum laboratories. Although these resources are readily available at relatively low cost, it is recommended that they be subjected to local verification by a program advisory committee or local workers.

When existing competency lists cannot be located or appear to be inadequate or inappropriate, another option for competency identification is DACUM (Developing A Curriculum). Begun in Clinton, Iowa, in the late 1960s, the process has been used extensively in the United States and Canada. DACUM involves 8 to 12 local expert workers in a structured brainstorming session for two to three days to generate a comprehensive list of worker duties and tasks.

While DACUM is an excellent means of identifying valid competencies and securing a feeling of local ownership, the process requires careful planning. Typically, instructors identify expert workers in the area, and companies are contacted and requested to release workers for the two or three-day session. Contacts with local business people can be invaluable in helping to secure DACUM panel members.

As an administrator, one must weigh the relative costs and feasibility of these methods against the outcomes and potential gains. As always, program instructors and department heads should be involved in the decision-making process. However, one must consider the impact of selecting one competency identification procedure over another and the impact of using several different approaches, with products that vary in format, wording and scope.

Task Verification

Verifying the occupational tasks confirms that the items listed in fact describe the occupation and, specifically, the local occupational situation, into which students will be placed. To structure the verification process, certain decisions must be made: (a) Who will conduct the verification? (b) Who will participate in the actual verification? and (c) What questions will be asked? In all likelihood, during the decision-making stages, there should be major involvement of three parties: (a) an administrator, (b) the staff responsible for conducting the verification (e.g. those designated as curriculum developers), and (c) advisory committee members.

At the planning meetings, the following decisions will need to be made, with input from all members of the group:

Who will conduct the verification process?

- A member of the administrative staff, such as an evaluation specialist
- A specially appointed and trained group of faculty
- A previously appointed staff, such as a team of curriculum developers
- Other personnel

What questions will be asked?

- If you want only to verify the skills as real and relevant, you can ask incumbents simply to review each item on the analysis and check it if it is actually performed as part of that job.
- If you wish to gather other information relevant to sequencing and curriculum development, your verification instrument or interview could include other questions such as: (a) How important is the task? (b) How difficult is it to learn to perform the task? (c) Is the task performed by beginning workers? and (d) How often is the task performed? Some other task-rating options are listed in Appendix C.

Who will be asked to verify the tasks?

- Employees (incumbent workers in an occupation)
- Immediate supervisors of such workers
- Local employers who hire workers in this area
- Advisory committee members

What key activities need to occur and what will be the schedule for their completion?

- Design of instrument or questionnaire
- Pilot test of instrument
- Contacting of respondents

One must ensure that whatever verification process is selected is feasible and effective within the budget. Once the decisions have been made, one should act as a facilitator making sure the necessary forms are processed quickly, being aware of the progress made, and furthering that progress. If some verification is to be done through interviews or observation, one can help by training the interviewers or writing letters of introduction to help interviewers have access to employers.

Conducting Task Analysis

At some point, each verified task statement must be analyzed – broken down into at least the knowledge, skills and attitudes required to perform it. This step serves several very important purposes, one of which is to provide teachers with a more detailed basis for developing instructional materials. More importantly, however, it helps the curriculum developer to identify the relative "size" of the competencies listed. No matter how carefully defined and structured the analysis process has been, competencies inevitably vary in size, that is, in the amount of time and effort required to teach or to learn the skill. By analyzing each competency, one can identify and remedy these inconsistencies.

It is helpful to provide curriculum developers with a simple chart to use to structure the completion of this step (see Appendix D). Using such a chart, one can analyze each competency to determine (a) the steps involved, (b) the cognitive (knowledge) elements involved, and (c) affective (attitude) elements involved.

Often, a more complex form (see Appendix E) is used for technical, supervisory and managerial tasks. It requires analyzing each verified task to determine (a) the steps involved, (b) the tools, equipment, materials, supplies and people needed, (c) safety factors, (d) related knowledge (mathematics, science, language) required, (e) the attitudes that are important, and (f) the performance standards expected. In some cases, we are also identifying all the decisions that must be made by the worker, what cues the worker is given to aid in the decision-making process, and the errors that will result if incorrect decisions are made.

Developing Competency-Based Instructional Materials

Although the use of individualized learning packages is not an *essential* element of CBE, most fully functioning CBE programs have recognized the potential of this approach for focusing on the individual development and evaluation of the specified competencies for each student.

This means that, in a CBE system, the instructional development process generally moves directly from the identification, analysis and clustering of competencies to the development of learning packages and strategies to deliver on those competencies. The conventional approach – involving as it does more emphasis on content areas and group instruction within specified blocks of time – moves instead to the development of overall plans for a course or program, and then to unit and lesson plans.

In many institutions, individual instructors are given total responsibility for developing, continually updating, and revising the learning packages students will use. Given a list of the competencies to be achieved by students, they decide how each competency will be taught, what prerequisites are required, what instructional strategies will be employed, and what criteria will be used to evaluate student performance. These decisions are used to organize the content of the learning packages.

In other institutions, particularly when more than one instructor will be using the materials, the development of learning packages is a team effort. An efficient and productive materials development team consists of an educational technologist, a typist, and one or more instructors. With CBE, a new teacher may "inherit" from another instructor, not a course of study and series of lesson plans, but a list of competencies and a series of learning packages.

High-quality materials do not presently exist in all occupational areas. Thus, it is more than likely that staff involved in competency-based instruction will need to develop their own learning packages or at least work with others in a team effort. To assure the production of high-quality, usable, effective materials, you will need to provide funds and staff time for the development effort and ensure that staff have the needed training. Some institutions schedule workshops and bring in outside consultants with expertise in CBE and the development of learning packages.

There are at least two types of learning packages, with some definite advantages and disadvantages inherent in each. *Learning guides* are simple materials. They are reusable packs containing directions for learning activities and they explain where to go for needed resources. They may be developed relatively quickly by school personnel, and they are fairly inexpensive to reproduce. Obviously, their effectiveness is dependent upon the quality and availability of the support resources to which they refer.

Modules, which are basically self-contained, transportable, and consumable in nature, have the advantage of being completely under the control of the developers. The instructional content and approach can be tailored to meet the particular needs of the program and few outside resources are needed. Self-contained modules, however, can be very time-consuming and expensive to develop, and they demand greater expertise in their production. Most CBE programs are now using learning guides, along with some instructor-produced instructional materials to enhance the learning activities.

Assessment Procedures

As an administrator in a school or college that has implemented CBE, you set the tone for a productive, positive learning environment. Assessment of student knowledge and performance is one of the most difficult and potentially divisive issues in CBE. Before any instructional or organizational changes are made regarding assessment, one would be wise to examine one's assumptions about student assessment and to lead staff in reaching a consensus on the philosophy of student-evaluation. In conventional education systems, evaluation is based on a cumulative average of work done in a term or semester. In CBE programs, evaluation is based on successful attainment of individual competencies in actual or simulated job situations. In conventional systems, a student's grade is affected by the accomplishments of his/her peers (norm-referenced). In a CBE system, students are rated according to occupational standard of performance (criterion-referenced).

Most CBE programs either require or provide an opportunity for students to first rate their own performance against established criteria. Once a student is satisfied that he or she can meet the criteria, then the instructor is asked to evaluate the performance. If the student's ratings are confirmed by the instructor's evaluation, the student can move on to work on another competency. If, according to the instructor's evaluation, the student cannot yet perform the skill successfully, the student continues to study and practice until competence is achieved.

In conventional systems, learning time is constant and achievement is variable. In a CBE system, learning time is variable and a student must achieve an acceptable level of proficiency on each skill.

Although existing institutional procedures and regulations may make it difficult, if not impossible, to conduct a truly competency-based approach to assessment, adopting a philosophy or approach to evaluation that is student-centered and competency-based will enhance the functioning of a CBE program, even in a conventionally organized institution.

Occupational Skill Competency-Testing

The growth of competency-based education has brought with it the need to provide standardized measures of student performance in vocational-technical programs and the proliferation of occupational tests developed to achieve that end. Governmental criteria for evaluating vocational-technical programs have spurred test development even more. Today, in the United States, tests are being developed at all levels, from individual programs to consortia involving several states and agencies.

In order to avoid duplication of effort, those undertaking test development need to be aware of:

- What tests or item banks already exist?
- What other projects are currently planned or underway that might parallel local efforts?
- Which products have been systematically developed and verified?
- What systems have been established for developing and verifying test items?
- What mechanisms exist for sharing information and products?
- What testing-related services exist that might meet local needs?
- How specific products or services can be obtained?

Test Types and Features

A variety of test products and services are available, as follows:

Occupation-specific tests. Many occupation-specific tests have been developed in all program areas of vocational education and a wide range of postsecondary level programs. Developed from occupational task lists, tests include criterion-referenced items that have been verified as representative of the competencies required of a worker in the occupation. These tests are usually keyed to locally developed task lists and/or broader item-bank systems. They are most often shared in "hard copy" form, although some have been or are being placed in computerized systems that provide for on-line student assessment.

Item banks. Item banks, as denoted by the name, are collections of individual test items from which tests can be created. Stored by computer and keyed to task lists, they may be used to assemble item sets or to custom-design tests. V-TECS has one of the largest vocational test item banks, although some states are creating their own banks of items developed originally on paper.

Cognitive tests. By far the majority of competency-based tests are measures of cognitive achievement. Multiple-choice items predominate on cognitive tests and item bank entries, with a few true/false items mixed in. Cognitive tests may be paper-and-pencil or on-screen computer-based instruments.

Performance tests. A few projects have developed performance tests designed to measure achievement of psychomotor skills. Usually these are either: (a) product or performance mastery checklists or record sheets, or (b) work assignments designed to sample manipulative skills in the occupation. In either case the tests include criteria for evaluating student performance. Test props in some cases are provided as part of the package; in others they are listed and must be provided by the agency that uses the tests.

Affective measures. This aspect of evaluation has received the least amount of emphasis. Work habit inventories are available for some programs; otherwise, specific items related to work attitude items are sometimes included in either performance checklists or cognitive tests.

Selecting Tests For Local Use

When selecting items or tests for local use, the questions of quality, appropriateness, currency, local relevance, convenience and usefulness should be considered.

High-quality tests have the following characteristics:

- *Validity and reliability*. Good tests measure what they are intended to measure and they do so consistently. Tests and test items that have been developed by trained item developers, reviewed by experts, validated in terms of importance to the occupation, and field-tested with large numbers of students have a greater chance of being valid and reliable.
- *Criterion-referenced*. Criterion-referenced (as distinct from norm-referenced) tests assess ability in terms of predetermined criteria which in turn are based on realistic occupational behaviors.
- *Appropriateness*. Tests should use appropriate evaluation methods for the types of objectives to be measured. Written, multiple-choice items, for example, can provide an effective measure of cognitive achievement or occupational knowledge. Only in limited cases (e.g. an occupation like bookkeeping, in which the job skills can be realistically simulated on paper) would paper-and-pencil tests effectively measure psychomotor achievement or job skills. Performance tests generally provide the best measure of psychomotor achievement.
- *Currency*. As occupational practices change, so must the related curricula and evaluation instruments. A test that was carefully developed ten years ago in a technological field is likely to bear little resemblance to current job requirements and performance standards for the occupation. Task lists and tests must be reviewed on a regular basis and updated as necessary to ensure

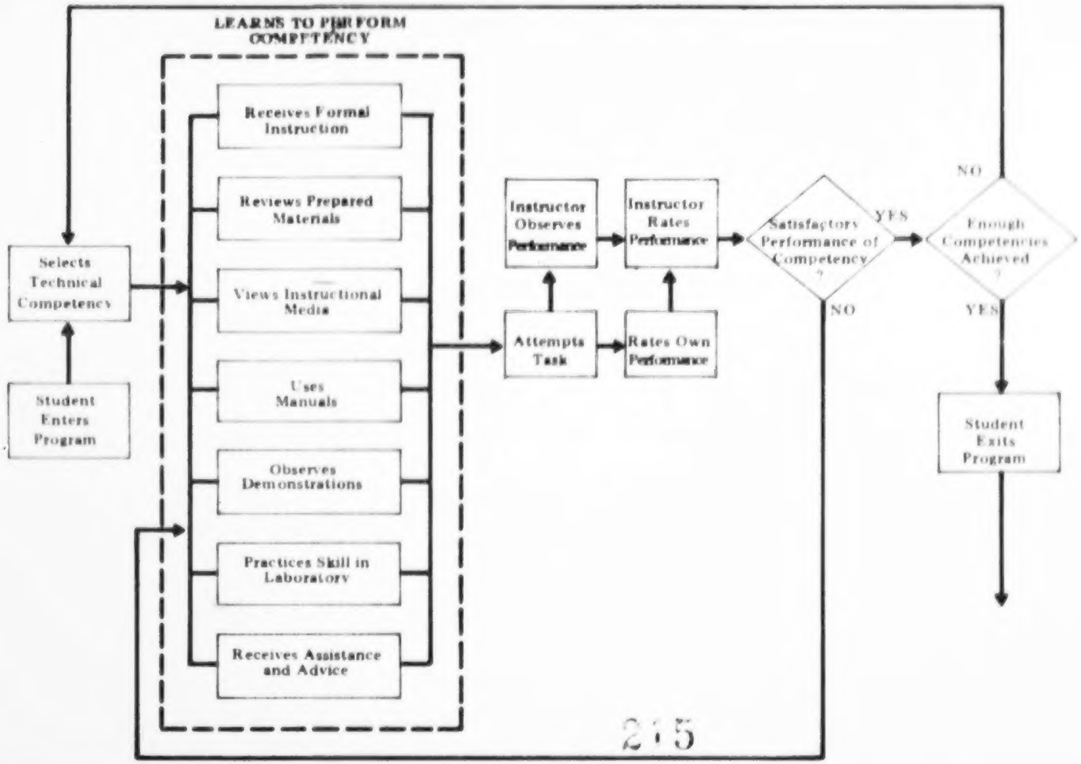
that they reflect current competencies and performance standards for the occupation.

- *Local relevance.* No matter how carefully a test has been developed, it will not be useful unless it represents locally relevant occupational goals and objectives. Any test materials acquired from other sources should be carefully examined with this in mind and adapted, as necessary, to local conditions.
- *Convenience and usefulness for local purposes.* There are many factors to be considered in relation to convenience and usefulness. Many of these have already been discussed. Generally speaking, the questions to be answered are whether local needs will be best served by obtaining outside materials and which particular materials best meet those needs.

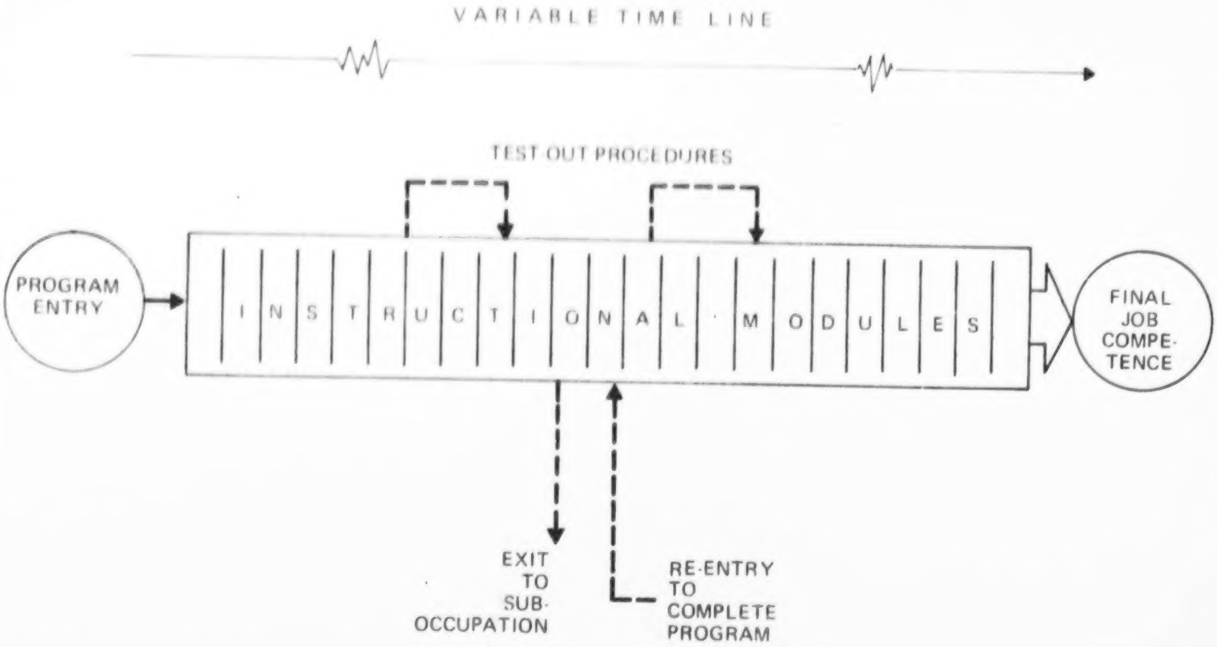
Whether one is implementing one's own CBE program, helping others implement such a program, or evaluating programs implemented by others, some means of formative evaluation can be very helpful. With the essential elements and the desirable characteristics in mind, a Competency-Based Education Program Evaluation Checklist (see Appendix F) has been devised to help in assessing the status of any CBE program. It is recognized that different countries have somewhat differing philosophies about what CBE is and so the checklist may have to be modified to fit local philosophies. Nevertheless, the criteria listed reflect the minimum essential program elements that are generally recognized as necessary to assure overall program quality. It is hoped that the instrument can be used in a positive way to promote the implementation of high-quality CBE programs that will better meet vocational and technical education needs.

LEARNING-EVALUATION MODEL

Appendix A


LEARNS TO PERFORM COMPETENCY
Student Enters Program
Selects Technical Competency
Receives Formal Instruction
Reviews Prepared Materials
Views Instructional Media
Uses Manuals
Observes Demonstrations
Practices Skill in Laboratory
Receives Assistance and Advice
Attempts Task
Instructor Observes Performance
Rates Own Performance
Instructor Rates Performance
Satisfactory Performance of Competency ?
YES
NO
Enough Competencies Achieved ?
NO
YES
Student Exits Program

MODEL OF COMPETENCY-BASED VOCATIONAL PROGRAM


VARIABLE TIME LINE
TEST OUT PROCEDURES
PROGRAM ENTRY
INSTRUCTIONAL MODULES
FINAL JOB COMPETENCE
EXIT TO SUB-OCCUPATION
RE-ENTRY TO COMPLETE PROGRAM

SOME TASK RATING OPTIONS

1. IMPORTANCE OF THE TASK	refers to its criticality to the overall job.
2. TASK LEARNING DIFFICULTY	refers to how difficult it is to learn to perform the task satisfactorily.
3. FREQUENCY OF TASK PERFORMANCE	indicates how frequently the task is performed by workers.
4. TIME SPENT PERFORMING THE TASK	indicates the approximate percentage of work time spent performing the task.
5. CONSEQUENCE OF INADEQUATE PERFORMANCE	indicates the degree to which inadequate performance affects personnel, equipment, etc.
6. TASK DELAY TOLERANCE	refers to the amount of delay that can be tolerated without undesirable results.
7. ENTRY LEVEL	indicates whether performance of this task is expected of beginning workers.
8. PROBABILITY OF DEFICIENT PERFORMANCE	indicates how likely it is that the task will be performed unsatisfactorily.
9. PER CENT PERFORMING	indicates the percentage of job holders who actually perform this task.
10. DEGREE OF TRAINING NEEDED	indicates the amount of training that most workers will need in order to effectively perform the task.

Appendix C

EXHIBIT: RESEARCH SCIENTIST/ENGINEER

Task No. 2.14 – ADDRESS SAFETY ISSUES

In performing this task the Research Scientist/Engineer in Fuels Utilization Technology will need to:

COMPLETE THESE STEPS	KNOW THE FOLLOWING	EXHIBIT THESE ATTITUDES
1. Incorporate safety considerations into equipment design	Relevant design and safety codes	
2. List laboratory activities to be conducted	Scope of project	
3. Determine experience of technical staff in conducting these activities	Assessment procedures	No one is too experienced
4. Identify hazards (electrical, chemical, thermal, mechanical) associated with each activity	The nature of safety hazards How to identify safety hazards	Concern for welfare of workers
5. Analyze experimental protocol for obvious trouble areas	Common safety violations	Non assuming
6. List all activities that could turn out wrong, causing an accident		Open and creative mind
7. Formulate a worst-accident situation		
8. Review safety procedures		Cost of safety is never too high
9. Prepare an action plan to respond to a major accident		
10. Educate staff and management on all safety issues		
11. Train staff to recognize potential hazards, and how to react to an accident	Locations of safety equipment; exits; alarms	
12. Conduct periodic safety checks		Be uncompromising
13. Interface with organization safety		

SECRETARY

TASK ANALYSIS FORM

Appendix E

DUTY: PREPARE WRITTEN DOCUMENTS

TASK: PREPARE A BUSINESS LETTER

Steps	Standards (How Well)	Tools and Materials	Safety	Related Knowledge			Attitudes
				Science	Mathematics	Language	
1. Decide on letter format	business letter format used					understand business letter format	
2. Select materials	appropriate letterhead	stationery	avoid paper cuts			type styles	
	appropriate type style	typeheads					
3. Check draft for spelling, punctuation and editing	error free					editing skills, grammar, spelling and punctuation	caring attitude
4. Edit letter as needed		pencil/pen					
5. Type letter	error free	typewriter or word processor		typewriter or word processor			concern for quality
6. Proofread letter							
7. Make corrections or retype		typewriter or word processor		typewriter or word processor			
8. Make final check	error free neat					proofreading skills	appreciation for accuracy and neatness
9. Submit to writer	within reasonable time						

Appendix F

COMPETENCY-BASED EDUCATION
PROGRAM EVALUATION CHECKLIST

Program ________________________

Name ________________________

Date ________________________

Directions: Indicate the extent to which the program being evaluated has implemented each of the following essential elements and desirable characteristics by checking the appropriate box under Level of Implementation.

	Level of Implementation			
	Poor	**Fair**	**Good**	**Excellent**
A. ESSENTIAL CHARACTERISTICS:				
1. Competencies to be achieved by the students have been:				
a. carefully identified	☐	☐	☐	☐
b. verified by local experts	☐	☐	☐	☐
c. made public	☐	☐	☐	☐
2. Criteria for assessing each of the verified competencies have been:				
a. derived from analysis of the competencies	☐	☐	☐	☐
b. explicitly stated along with conditions	☐	☐	☐	☐
c. made public	☐	☐	☐	☐
3. Instructional program provides for the:				
a. individual development of each competency	☐	☐	☐	☐
b. individual assessment of each competency	☐	☐	☐	☐
4. Assessment of the students competency:				
a. takes knowledge into account	☐	☐	☐	☐
b. takes attitudes into account	☐	☐	☐	☐
c. requires actual performance of the competency as the major source of evidence	☐	☐	☐	☐
5. Students progress through the program:				
a. at their own rate	☐	☐	☐	☐
b. by demonstrating their competence	☐	☐	☐	☐
B. DESIRABLE CHARACTERISTICS				
6. Instruction is individualized to the maximum extent possible	☐	☐	☐	☐
7. Learning experiences are guided by frequent feedback	☐	☐	☐	☐
8. Emphasis is upon students' achievement of exit requirements	☐	☐	☐	☐
9. Instruction is individually paced rather than time-based	☐	☐	☐	☐
10. Instruction is field-centered using realistic work situations and actual on-the-job experiences	☐	☐	☐	☐
11. Instructional materials are:				
a. modularized	☐	☐	☐	☐
b. mediated	☐	☐	☐	☐
c. flexible with both required and optional learning activities provided	☐	☐	☐	☐
12. The instructional program as a whole is carefully planned and systematic-evaluation data is used for program improvement	☐	☐	☐	☐

Level of Implementation: In a fully implemented CBE program, all items will receive an excellent response. If any item receives a Poor or Fair response, you should meet with your competency-based education program coordinator to determine what changes are needed and how you can get help in making them.

Appendix G

READINESS INVENTORY

As an aid in reviewing your attitudes and knowledge concerning CBE, complete the following inventory. Read each of the items listed, and place an X in the appropriate box to indicate your feelings concerning that item, using the following scale:

1 = Feel extremely uncomfortable
2 = Feel uncomfortable
3 = Undecided
4 = Feel comfortable
5 = Feel extremely comfortable

	1	2	3	4	5
How comfortable would you feel if a learner:					
1. began learning at a time of his/her choosing	☐	☐	☐	☐	☐
2. completed learning activities according to his/her own schedule	☐	☐	☐	☐	☐
3. worked at his/her own pace	☐	☐	☐	☐	☐
4. studied what he/she needed to study	☐	☐	☐	☐	☐
5. participated actively in setting his/her own objectives	☐	☐	☐	☐	☐
6. learned in a field-based (on-the-job) environment	☐	☐	☐	☐	☐
7. accepted more responsibility for learning	☐	☐	☐	☐	☐
8. took advantage of his/her personal learning style	☐	☐	☐	☐	☐
9. actively participated in the evaluation of his/her progress	☐	☐	☐	☐	☐
How comfortable would you feel if a learner did NOT:					
10. study in the same manner as other students in the same program	☐	☐	☐	☐	☐
11. use the same material for learning as other students	☐	☐	☐	☐	☐
12. use the same learning experiences as others	☐	☐	☐	☐	☐
13. progress at the same rate as others in the class	☐	☐	☐	☐	☐
How comfortable would you feel if you, as an instructor:					
14. taught the same subject in a different way from one term to the next	☐	☐	☐	☐	☐
15. used different learning activities for different students	☐	☐	☐	☐	☐
16. worked with students individually	☐	☐	☐	☐	☐
17. assigned out-of-class activities in exchange for classroom attendance	☐	☐	☐	☐	☐
18. used media to present information	☐	☐	☐	☐	☐

	1	2	3	4	5
19. assisted students in self-evaluation rather than red-penciling written assignments yourself	☐	☐	☐	☐	☐
20. asked a learner "How do you feel you did?" rather than simply assigning a letter grade	☐	☐	☐	☐	☐
21. held learners accountable for successfully performing specific skills rather than for normative scores on paper and-pencil tests	☐	☐	☐	☐	☐
22. expected the learner to accept major responsibility for learning	☐	☐	☐	☐	☐
23. used knowledgeable and experienced students to instruct other students	☐	☐	☐	☐	☐
24. allowed leerners to choose from a list of program competencies rather then having them work to complete predetermined objectives	☐	☐	☐	☐	☐
25. prepared learning plans that assisted students in their learning rather than lesson plans that assisted you in your teaching	☐	☐	☐	☐	☐
26. were available when students needed you rather than requiring students to be in attendance when you were scheduled to teach	☐	☐	☐	☐	☐
27. used student input to set goals for professional improvement	☐	☐	☐	☐	☐

How comfortable would you feel if you, as an instructor, did NOT:

28. rely primarily on lectures as a means of transmitting information to students	☐	☐	☐	☐	☐
29. expect every student in a class to achieve the same skills	☐	☐	☐	☐	☐
30. expect all students to achieve at the same rate	☐	☐	☐	☐	☐

Level of Performance: Ideally, for each item, you should have placed an X in the *4* or *5* box. However, if you were honest, some of your items probably received lower ratings. Make a note of those items that you rated *1, 2,* or *3* – these are the areas in which you need greater knowledge, skills or experience before you can successully implement CBE. Then go on to complete the next activity, in which you can develop a plan to gain the greater knowledge, skills and experience that you need.

SOURCE: Adapted from a list by James Pollard, Spokane Community College.

Appendix H

IMPLEMENTATION ISSUES

CBE IMPLEMENTATION QUESTIONS

A. *Overall Approach to CBE*
  1. What will the CBE program be officially called in your institution?
  2. What known constraints or limitations presently exist in your institution?
  3. Who will have primary responsibility for designing the CBE program?
  4. How will faculty and staff provide input into the CBE program design?
  5. How will information about other CBE programs be gathered and used?
  6. How will final policy decisions on the CBE effort be made?

B. *Program Structure for CBE*
  1. When will students be able to enrol in programs?
  2. When will students be able to exit as successful program completers?
  3. How will suboccupations within the total program be identified?
  4. Will training programs be divided into courses or treated as total programs?
  5. How will advanced placement for experienced students within programs be handled?
  6. How will licensing requirements be reconciled with the CBE program?

C. *Administration of Programs*
  1. How will student registration and enrolment be handled?
  2. What will be the tuition and fee schedule?
  3. How will students be oriented to the CBE approach and to the institution?
  4. How will teaching loads and other instructor responsibilities be modified to meet the needs of CBE?
  5. How will part-time instructors be involved in the CBE program?

6. What form of competency transcript will be given to program leavers and completers?
7. How will program completers and leavers be reported?
8. Where will additional funds for CBE start-up costs be found?

D. *Identification of Occupational Competencies*

1. Who will have primary responsibility for developing the list of occupational competencies for a program?
2. What will be source(s) of the basic list of occupational competencies for each program?
3. How will program competencies be locally verified?
4. What form (chart, list, etc.) will the program competencies take?
5. How often will competencies be reviewed and revised for a program?

E. *Instructional Delivery*

1. What procedures will be followed when a student enters a program?
2. How will a student's entering level of competency be evaluated and verified?
3. How will personalized student programs be designed?
4. How will laboratory and drill time be provided?
5. What policies for student attendance and tardiness will be adhered to?
6. How will average time for achievement of each competency be computed?
7. What latitude for progress within the program will students be permitted?
8. How will individual, small-group, and large-group instruction be organized?
9. How will clinical experiences be organized and delivered?
10. How will field experiences be organized and delivered?

F. *Instructional Materials*

1. How will instructional materials and media be acquired?
2. Will a common learning guide format be used for all programs?
3. Who will have responsibility for developing the format?
4. How will the *production* of instructional materials be organized?

   a. Who will develop the printed materials?
   b. Who will produce the media materials?
   c. How will their work be supported (training, time, money)?
   d. Who will provide technical assistance and supervision?
   e. How will materials be reproduced and paid for?
5. How will the *purchase* of instructional materials be organized?
   a. How will outside sources be located?
   b. How will materials be evaluated and selected?
   c. Will materials be adapted or used as is?
   d. How will purchase costs be covered?

G. *Student Assessment Procedures*
1. What will be the relationship of testing for cognitive knowledge and assessment of technical performance in each program?
2. What student assessment procedures will be used?
3. How will standards of acceptable performance be set?
4. Who will develop performance tests for each competency?
5. Who will develop specific criteria for performance of each competency?
6. What will be the format for the assessment instruments?
7. What form of rating scale will be used to evaluate each competency?
8. How will situations and materials for performance testing be provided?

H. *Reporting of Student Progress and Achievement*
1. Who will certify achievement of each competency by each student?
2. How will achievement of each competency be reported?
3. How will students be kept informed and advised about their progress?
4. What "grading" system will be used to report student achievement?
5. How will permanent records of student achievement be organized and maintained?

I. *Preparation of Personnel for CBE*
1. Who will be responsible for designing and delivering staff development activities?
2. How will faculty and staff be given initial information about CBE?

3. How will essential competencies for instructors and others be identified?
4. What materials will be developed to help prepare faculty for CBE?
5. Who will assist faculty as they encounter specific problems in implementing CBE?
6. What outside assistance will be made available to faculty and staff preparing to implement CBE?
7. How will the first programs to implement CBE be selected?

J. *Provision of Physical Facilities*

1. Who will be primarily responsible for adapting physical facilities for CBE programs?
2. What will be the scope of changes made in existing facilities?
3. How will resource centers be provided for each program?
4. How will resource centers be managed and staffed?
5. What additional audiovisual equipment will be needed for CBE programs?
6. What kinds of microcomputers or terminals will be needed?
7. Where will the instructor work stations be located?

Appendix I

NEEDS SURVEY: TEACHING SKILLS

Directions: This instrument lists 132 teaching skills identified through research conducted by the National Center for Research in Vocational Education as important to the role of the vocational teacher. Two scales are provided. For each skill listed, please circle the appropriate number on each scale to indicate (1) your current ability to perform this skill and (2) your desire or need to further improve your ability to perform the skill. *Your individual responses will be kept in strict confidence; they are for your use in working with your supervisor to plan your professional development program.*

Name ____________________

Date ____________________

Teaching Skills	Current Ability				Desire/Need To Improve in this Area			
	Poor	Fair	Good	Excellent	Low	Medium	High	Very High
Category A: Program Planning, Development and Evaluation								
A-1 Prepare for a community survey	1	2	3	4	1	2	3	4
A-2 Conduct a community survey	1	2	3	4	1	2	3	4
A-3 Report findings of a community survey	1	2	3	4	1	2	3	4
A-4 Organize an occupational advisory committee	1	2	3	4	1	2	3	4
A-5 Maintain an occupational advisory committee	1	2	3	4	1	2	3	4
A-6 Develop program goals and objectives	1	2	3	4	1	2	3	4
A-7 Conduct an occupational analysis	1	2	3	4	1	2	3	4
A-8 Develop a course of study	1	2	3	4	1	2	3	4
A-9 Develop long-range program plans	1	2	3	4	1	2	3	4
A-10 Conduct a student follow-up study	1	2	3	4	1	2	3	4
A-11 Evaluate your vocational program	1	2	3	4	1	2	3	4
Category B: Instructional Planning								
B-1 Determine needs and interests of students	1	2	3	4	1	2	3	4
B-2 Develop student performance objectives	1	2	3	4	1	2	3	4
B-3 Develop a unit of instruction	1	2	3	4	1	2	3	4
B-4 Develop a lesson plan	1	2	3	4	1	2	3	4

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Teaching Skills	Current Ability				Desire/Need To Improve in this Area			
	Poor	Fair	Good	Excellent	Low	Medium	Very High	High
B-5 Select student instructional materials	1	2	3	4	1	2	3	4
B-6 Prepare teacher-made instructional materials	1	2	3	4	1	2	3	4
Category C: Instructional Execution								
C-1 Direct field trips	1	2	3	4	1	2	3	4
C-2 Conduct group discussions, panel discussions, and symposiums	1	2	3	4	1	2	3	4
C-3 Employ brainstorming, buzz group, and question box techniques	1	2	3	4	1	2	3	4
C-4 Direct students in instructing other students	1	2	3	4	1	2	3	4
C-5 Employ simulation techniques	1	2	3	4	1	2	3	4
C-6 Guide student study	1	2	3	4	1	2	3	4
C-7 Direct student laboratory experience	1	2	3	4	1	2	3	4
C-8 Direct students in applying problem-solving techniques	1	2	3	4	1	2	3	4
C-9 Employ the project method	1	2	3	4	1	2	3	4
C-10 Introduce a lesson	1	2	3	4	1	2	3	4
C-11 Summarize a lesson	1	2	3	4	1	2	3	4
C-12 Employ oral questioning techniques	1	2	3	4	1	2	3	4
C-13 Employ reinforcement techniques	1	2	3	4	1	2	3	4
C-14 Provide instruction for slower and more capable learners	1	2	3	4	1	2	3	4
C-15 Present an illustrated talk	1	2	3	4	1	2	3	4
C-16 Demonstrate a manipulative skill	1	2	3	4	1	2	3	4
C-17 Demonstrate a concept or principle	1	2	3	4	1	2	3	4
C-18 Individualize instruction	1	2	3	4	1	2	3	4
C-19 Employ the team teaching approach	1	2	3	4	1	2	3	4
C-20 Use subject matter experts to present information	1	2	3	4	1	2	3	4
C-21 Prepare bulletin boards and exhibits	1	2	3	4	1	2	3	4

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Teaching Skills	Current Ability				Desire/Need To Improve in this Area			
	Poor	Fair	Good	Excellent	Low	Medium	High	Very High
C-22 Present information with models, real objects, and flannel boards	1	2	3	4	1	2	3	4
C-23 Present information with overhead and opaque materials	1	2	3	4	1	2	3	4
C-24 Present information with filmstrips and slides	1	2	3	4	1	2	3	4
C-25 Present information with films	1	2	3	4	1	2	3	4
C-26 Present information with audio recordings	1	2	3	4	1	2	3	4
C-27 Present information with televised and videotaped materials	1	2	3	4	1	2	3	4
C-28 Employ programmed instruction	1	2	3	4	1	2	3	4
C-29 Present information with the chalkboard and flip chart	1	2	3	4	1	2	3	4
C-30 Provide for students' learning styles	1	2	3	4	1	2	3	4
Category D: Instructional Evaluation								
D-1 Establish student performance criteria	1	2	3	4	1	2	3	4
D-2 Assess student performance: knowledge	1	2	3	4	1	2	3	4
D-3 Assess student performance: attitudes	1	2	3	4	1	2	3	4
D-4 Assess student performance: skills	1	2	3	4	1	2	3	4
D-5 Determine student grades	1	2	3	4	1	2	3	4
D-6 Evaluate your instructional effectiveness	1	2	3	4	1	2	3	4
Category E: Instructional Management								
E-1 Project instructional resource needs	1	2	3	4	1	2	3	4
E-2 Manage your budgeting and reporting responsibilities	1	2	3	4	1	2	3	4
E-3 Arrange for improvement of your vocational facilities	1	2	3	4	1	2	3	4
E-4 Maintain a filing system	1	2	3	4	1	2	3	4

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Teaching Skills	Current Ability				Desire/Need To Improve in this Area			
	Poor	Fair	Good	Excellent	Low	Medium	High	Very High
E-5 Provide for student safety	1	2	3	4	1	2	3	4
E-6 Provide for the first aid needs of students	1	2	3	4	1	2	3	4
E-7 Assist students in developing self-discipline	1	2	3	4	1	2	3	4
E-8 Organize the vocational laboratory	1	2	3	4	1	2	3	4
E-9 Manage the vocational laboratory	1	2	3	4	1	2	3	4
E-10 Combat problems of student chemical use	1	2	3	4	1	2	3	4
Category F: Guidance								
F-1 Gather student data using formal data-collection techniques	1	2	3	4	1	2	3	4
F-2 Gather student data through personal contacts	1	2	3	4	1	2	3	4
F-3 Use conferences to help meet student needs	1	2	3	4	1	2	3	4
F-4 Provide information on educational and career opportunities	1	2	3	4	1	2	3	4
F-5 Assist students in applying for employment or further education	1	2	3	4	1	2	3	4
Category G: School-Community Relations								
G-1 Develop a school-community relations plan for your vocational program	1	2	3	4	1	2	3	4
G-2 Give presentations to promote your vocational program	1	2	3	4	1	2	3	4
G-3 Develop brochures to promote your vocational program	1	2	3	4	1	2	3	4
G-4 Prepare displays to promote your vocational program	1	2	3	4	1	2	3	4
G-5 Prepare news releases and articles concerning your vocational program	1	2	3	4	1	2	3	4
G-6 Arrange for television and radio presentations concerning								

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Teaching Skills	Current Ability				Desire/Need To Improve in this Area			
	Poor	Fair	Good	Excellent	Low	Medium	High	Very High
your vocational program	1	2	3	4	1	2	3	4
G-7 Conduct an open house	1	2	3	4	1	2	3	4
G-8 Work with members of the community	1	2	3	4	1	2	3	4
G-9 Work with state and local educators	1	2	3	4	1	2	3	4
G-10 Obtain feedback about your vocational program	1	2	3	4	1	2	3	4
Category H: Vocational Student Organization								
H-1 Develop a personal philosophy concerning vocational student organizations	1	2	3	4	1	2	3	4
H-2 Establish a vocational student organization	1	2	3	4	1	2	3	4
H-3 Prepare vocational student organization members for leadership roles	1	2	3	4	1	2	3	4
H-4 Assist vocational student organization members in developing and financing a yearly program of activities	1	2	3	4	1	2	3	4
H-5 Supervise activities of the vocational student organization	1	2	3	4	1	2	3	4
H-6 Guide participation in vocational student organization contests	1	2	3	4	1	2	3	4
Category I: Professional Role and Development								
I-1 Keep up to date professionally	1	2	3	4	1	2	3	4
I-2 Serve your teaching profession	1	2	3	4	1	2	3	4
I-3 Develop an active personal philosophy of education	1	2	3	4	1	2	3	4
I-4 Serve the school and community	1	2	3	4	1	2	3	4
I-5 Obtain a suitable teaching position	1	2	3	4	1	2	3	4
I-6 Provide laboratory experiences for prospective teachers	1	2	3	4	1	2	3	4

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Teaching Skills	Current Ability				Desire/Need To Improve in this Area			
	Poor	Fair	Good	Excel-lent	Low	Medium	High	Very High
I-7 Plan the student teaching experience	1	2	3	4	1	2	3	4
I-8 Supervise student teachers	1	2	3	4	1	2	3	4
Category J: Coordination of Cooperative Education								
J-1 Establish guidelines for your cooperative vocational program	1	2	3	4	1	2	3	4
J-2 Manage the attendance, transfers and terminations of co-op students	1	2	3	4	1	2	3	4
J-3 Enroll students in your co-op program	1	2	3	4	1	2	3	4
J-4 Secure training stations for your co-op program	1	2	3	4	1	2	3	4
J-5 Place co-op students on the job	1	2	3	4	1	2	3	4
J-6 Develop the training ability of on-the-job instructors	1	2	3	4	1	2	3	4
J-7 Coordinate on-the-job instruction	1	2	3	4	1	2	3	4
J-8 Evaluate co-op students' on-the-job performance	1	2	3	4	1	2	3	4
J-9 Prepare for students' related instruction	1	2	3	4	1	2	3	4
J-10 Supervise an employer-employee appreciation event	1	2	3	4	1	2	3	4
Category K: Implementing Competency-Based Education (CBE)								
K-1 Prepare yourself for CBE	1	2	3	4	1	2	3	4
K-2 Organize the content for a CBE program	1	2	3	4	1	2	3	4
K-3 Organize your class and lab to install CBE	1	2	3	4	1	2	3	4
K-4 Provide instructional materials for CBE	1	2	3	4	1	2	3	4
K-5 Manage the daily routines of your CBE program	1	2	3	4	1	2	3	4

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Teaching Skills	Current Ability				Desire/Need To Improve in this Area			
	Poor	Fair	Good	Excel-lent	Low	Medium	High	Very High
K-6 Guide your students through the CBE program	1	2	3	4	1	2	3	4
Category L: Serving Students with Special/Exceptional Needs								
L-1 Prepare yourself to serve exceptional students	1	2	3	4	1	2	3	4
L-2 Identify and diagnose exceptional students	1	2	3	4	1	2	3	4
L-3 Plan instruction for exceptional students	1	2	3	4	1	2	3	4
L-4 Provide appropriate instructional materials for exceptional students	1	2	3	4	1	2	3	4
L-5 Modify the learning environment for exceptional students	1	2	3	4	1	2	3	4
L-6 Promote peer acceptance of exceptional students	1	2	3	4	1	2	3	4
L-7 Use instructional techniques to meet the needs of exceptional students	1	2	3	4	1	2	3	4
L-8 Improve your communication skills	1	2	3	4	1	2	3	4
L-9 Assess the progress of exceptional students	1	2	3	4	1	2	3	4
L-10 Counsel exceptional students with personal-social problems	1	2	3	4	1	2	3	4
L-11 Assist exceptional students in developing career planning skills	1	2	3	4	1	2	3	4
L-12 Prepare exceptional students for employability	1	2	3	4	1	2	3	4
L-13 Promote your vocational program with exceptional students	1	2	3	4	1	2	3	4
Category M: Assisting Students in Improving Their Basic Skills								
M-1 Assist students in achieving basic reading skills	1	2	3	4	1	2	3	4
M-2 Assist students in developing technical reading skills	1	2	3	4	1	2	3	4
M-3 Assist students in improving								

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Teaching Skills	Current Ability				Desire/Need To Improve in this Area			
	Poor	Fair	Good	Excel-lent	Low	Medium	High	Very High
their writing skills	1	2	3	4	1	2	3	4
M-4 Assist students in improving their oral communication skills	1	2	3	4	1	2	3	4
M-5 Assist students in improving their math skills	1	2	3	4	1	2	3	4
M-6 Assist students in improving their survival skills	1	2	3	4	1	2	3	4
Category N: Teaching Adults								
N-1 Prepare to work with adult learners	1	2	3	4	1	2	3	4
N-2 Market the adult education program	1	2	3	4	1	2	3	4
N-3 Determine individual training needs	1	2	3	4	1	2	3	4
N-4 Plan instruction for adults	1	2	3	4	1	2	3	4
N-5 Manage the adult instructional process	1	2	3	4	1	2	3	4
N-6 Evaluate the performance of adults	1	2	3	4	1	2	3	4

NOTES

1. Carroll, John B., "A Model of School Learning", *Teachers College Record*, 723-733, 1963.
2. Bloom, Benjamin S., *Human Characteristics and School Learning*, McGraw-Hill, New York, 1976.

Computer-Aided Instruction

Graham and Lynn Hunt

A challenge of the eighties and nineties for Asia is the need to increase economic self-sufficiency through the development of a technically competent human resource infrastructure. The Club of Rome, in its report entitled *No Limits to Learning*, identifying what it called the "world problematic", found that education and training systems could not provide individuals with the learning opportunities which would allow them to take advantage of rapid technological and social change. In many cases learning did not occur until some catastrophe had taken place. In contrast to this rather inefficient form of learning, the authors identified *innovative learning* as a process involving both anticipatory and participatory learning strategies. Behind the idea of innovative learning is the belief that if learning is to become efficient, the activities of the learning process and the goals of that learning must come under the control of the learner. The consequences which flow from this perspective significantly influence the competencies required of technical teachers as well as the learning strategies they will need to employ to create trainee competency.

The arrival of the silicon chip has heralded far more than just universal access to immensely powerful and increasingly inexpensive computers and computer technology. But, just as the press needed the skills of literacy to maximize its impact, the computer will need the skills of instructional design and courseware development to realize its potential for enabling individuals to choose and control purposeful learning.

IN SEARCH OF EFFECTIVE LEARNING

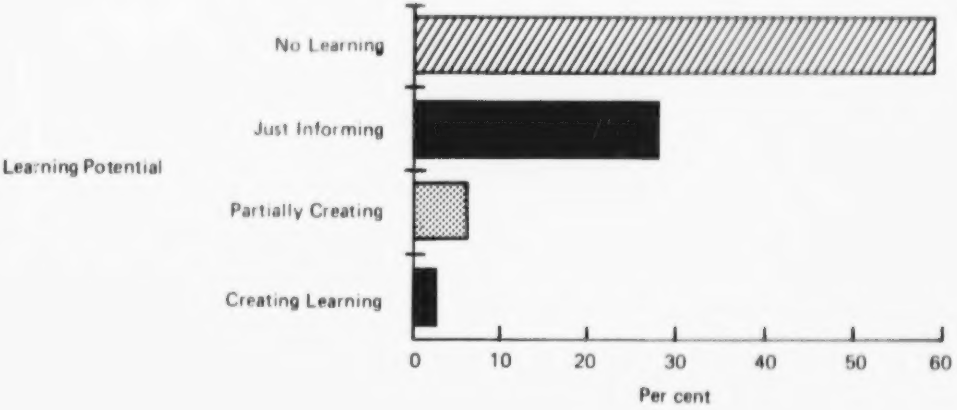
Traditionally, two points of view have competed in explaining the nature of learning and teaching. The first suggests that learning is directly attributable to the efficacy of the teacher, and almost all students are able to master what is being taught if given adequate instruction (Bloom, 1977). The second view takes the contrary stance that teaching is a relatively unimportant and vastly overvalued activity (Rogers, 1968), for the importance of learning does not lie in the knowledge which can be acquired, but in the process of learning how to learn.

A convergence of these views is achieved when the focus of instructional activity is shifted from an exposition of content to that of the creation of purposeful learning. In this perspective two determinants for learning predominate: defining what learning is relevant, and prescribing the conditions under which it is most likely to occur. In a study for the Asian Development Bank (Hunt, 1984), this perspective was applied to the identification of attributes which contributed to effective technical teacher performance. Five factors were found to influence how effective teachers were with their students. These were: their belief system or self concept; the perception of their mission; the range of teaching methods they were prepared to use; the degree of student participation they could engender; and, of greatest importance, their potential for creating learning (Figure 1). This last attribute provided the most significant predictor of teaching competency. Only a tiny percentage of the total sample of instructors demonstrated that they were creating learning. The majority spent most of their time in just giving information or performing a variety of administrative and custodial roles, but not ensuring that substantive learning was taking place. Although these results came from a single study, further evidence (Hunt, 1986) suggests that similar results could be obtained from any country and at every level of the education system. The only factor likely to substantially modify the impact that teachers have on student learning is the degree to which students themselves are able to become independent of their teachers for learning. This factor reflects as much student "ability" to learn (including their previous success in learning and strategies developed to provide for intrinsic reinforcement), as it does their access to resources for independent learning. To a varying degree, these students can learn in spite of their teachers. But for other students in whom these learner characteristics are not so well developed, nor instructional resources such as libraries, self-instructional programs and audiovisual aids so adequately available, the teacher makes the difference.

Two further observations are pertinent. First, more often than not staff are recruited into technical teaching primarily on the basis of their technical expertise, not on their capacity for delivering instruction. Second, when the question is asked, "How can we improve the quality of learning?", the usual answer given is to "make better teachers". But this answer invariably leads to the wrong solution. The traditional view on what should be done to upgrade the teaching quality of an institution is to increase their academic qualifications and levels of technical expertise. But as the study showed, academic and technical qualifications alone have little effect on a teacher's ability to create learning. But is there an approach to instructional delivery which can facilitate the role of teachers creating learning? We believe there is.

Figure 1

POTENTIAL FOR CREATING LEARNING



INSTRUCTIONAL SYSTEMS DEVELOPMENT

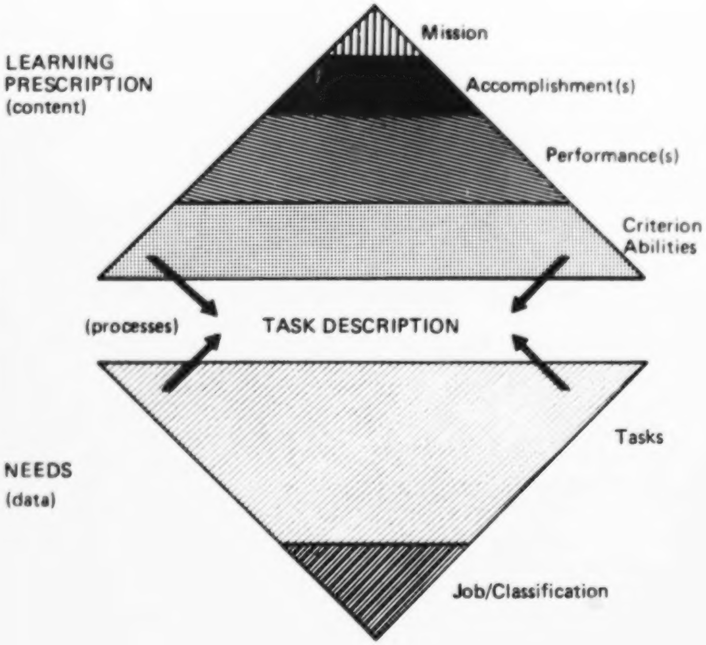
Instructional Design

A critical need in the search for improved systems for delivering instruction, particularly for computer-based training (CBT), is to develop procedures for defining content and specifying the conditions for translating that content into instructionally potent prescriptions for learning. The evidence to date is that most instructional strategies which underlie CBT systems for developing teaching content (authoring systems), while being mechanically efficient and intellectually seductive, they are instructionally irrelevant (O'Neal). The traditional approach to analyzing complex learning tasks for instructional purposes has been to identify the specific skills and sub-skills. This method has sometimes been referred to as a "bottom-up" process. Although the bottom-up and its alternative, "top-down", are both hierarchical in nature, the philosophy and methodology are quite different. In the bottom-up approach, the underlying assumption is that "information flows" work from the environment to the individual. For instance, in analyzing an aircraft pilot's recovery from a stall, the information flow may reveal the manipulation of subtasks such as: push control column forward, apply power, apply rudder to combat yaw. Each of these elements is identified as a reaction of the pilot to what is happening to the aircraft and to systems within the aircraft. They are his or her reactions to an information flow from the environment. In this perspective, the individual is seen to be reactive rather than proactive to the environment. The consequence for learning is that trainees may acquire sets of skills without any understanding of what those skills mean, and in the process of developing a curriculum for training, the abilities which underlie the specific tasks to be taught may get lost.

The second approach, typified by information-processing models of instructional design such as NEBEAT (Needs-Based Education and Training), define the nature of human competency as a synthesis of processes and products. The primacy of tasks is reduced to a point at which their relevance is limited to defining the contexts within which the abilities underlying a particular competency will be demonstrated. Competency descriptions identify both the abilities which provide the focus for instructional development and the task-related contexts which provide the parameters for those abilities. The pyramid mirror image (Figure 2) of the NEBEAT model reflects the interactive nature of the two. The identification of individual content factors in the learning prescription is the tactical result of a needs assessment process. These

Figure 2

NEBEAT INSTRUCTIONAL PRESCRIPTION MODEL


Mission
LEARNING PRESCRIPTION (content)
Accomplishment(s)
Performance(s)
Criterion Abilities
(processes)
TASK DESCRIPTION
Tasks
NEEDS (data)
Job/Classification

factors are represented as a series of ever-widening, increasingly inclusive statements.

Mission. At the apex of the pyramid is the mission or overriding goal of organizational activity. Mission statements are valid to the degree to which all participants, from policymakers to teachers, can agree on their usefulness in providing direction. In vocational teacher training such a mission might be:

> "To inculcate professional skills in vocational education lecturers, so that they can develop competencies in their students that will enhance their employment potential and contribute to the social well-being."

Accomplishment. This next level of the hierarchy describes individual performances which contribute to "accomplished" abilities. A teacher training mission may require developing five accomplishments: being a trainer, a learning facilitator, a content expert, a learning resource manager and a counsellor/helper. These accomplishments are presented as generic statements. To be made explicit in a task description, they would need to be further defined by their constituent performances and qualified by the contextual parameters (equipment, procedures, conditions and standards).

Performances. These are the content areas subsumed under each accomplishment. They are similar to accomplishments, except that they are more restricted and provide a convenient focus for specifying competencies. An accomplishment like "being a learning facilitator" may have three performances: managing a class (using psychological principles for maintaining and changing student behavior); creating learning (by incorporating student-centered instruction); and accommodating learner characteristics (identifying learner attributes to develop instructional strategies). As with accomplishments, each performance is presented as a generic statement requiring further specification of the competencies involved.

Criterion Abilities. These are the essential abilities which underlie a performance and reflect the capacity needed by the individual to carry out a task. This is different from the action statement found in most traditionally written instructional objectives which simply present the specific skills to be learned without identifying the underlying ability which is prerequisite to the skill being demonstrated (Monjan and Grassner, 1979).

Criterion abilities have five instructional characteristics when included in a competency description: (1) they are the essential factors involved in the performance; (2) they constitute the ability needed to engage in the process which makes it possible to become accomplished in a range of competencies; (3) they are generic and can be applied to a variety of performances and contexts; (4) they are identified independently of any task description; and (5) they are the final and delimiting (hence the word criterion) abilities in the performance.

Criterion abilities may be unique in relation to a performance or highly pervasive. For instance, in pilot training aeronautical decision-making is an ability which underlies almost every performance in flying. As a pervasive ability in a competency specification it receives a low general weighting. However, in a specific task such as "complete a flight plan", it may be moderately important to the ability of mastering "flight planning" and could be indicated by a medium specific weighting. On the other hand, a relatively unique ability in this example, "calculations", could have its uniqueness indicated by assigning it with a high relative weighting for the entire course (general), as well as a high relative weighting for the specific performance.

Any number of competency specifications can be generated from an instructional prescription. The learning prescription component, the pyramid, defining the content abilities is a constant. That is, once it has been identified from a mission's accomplishment, it remains basically unchanged, regardless of the range of applications or tasks that might be developed from it. Eventually, artificially intelligent tools (systems that can understand natural colloquial languages in contrast to computer languages and can learn to make judgments based on prior experience) will be able to translate data from needs assessment surveys into descriptions of criterion abilities and thereby reduce the inherent subjectivity of the process. The inverted pyramid, or data component of the prescription, provides the variable input. Each time a piece of equipment or operating procedure is changed, the information is defined in the task description. Thus, the task description component of the competency specification may change from one lesson or courseware to the next. But the learning prescription remains unaltered until the abilities themselves are changed.

Instructional Strategies

There are a number of instructional strategy models which have been applied to CBT. A promising one is Reigeluth's learner control or elaboration theory. A modified version of his model is described more fully here because of its attractiveness to the computer-based authoring component of instructional delivery.

Reigeluth frequently presents his model by describing the analogy of looking at instruction through a zoom lens. The zooming process is made up of a number of discrete levels of observation. It starts by taking a wide-angle view of the content to be studied. This is called an epitome. As the content is elaborated in a simple-to-complex sequence of teaching steps, the ideas are presented as concepts or procedures at a concrete, meaningful application level. We have modified his model somewhat in order to effectively provide a link between the process of competency specification and the strategies of authoring. The sequence of instructional strategy events is illustrated in Figure 3.

Step 1: Competency specification. The components in this step have been described previously. The criterion abilities form the key focus.

Step 2: Develop first epitome. Locate the criterion competency with the highest general weighting – its measure of uniqueness in relation to the abilities underlying all performances (it may not have the highest specific weighting). Check to see in which other performances it occurs. This is the first thing to be taught and should be sufficiently inclusive to relate to the learner's previous knowledge and experience and be capable of translation to new knowledge and experience.

Step 3: Sequence all remaining epitomes. Work from criterion abilities with high general weighting to those with low general weighting, and those with high specific weighting to those with low specific weighting. An analysis of these abilities will tell us about their relative contribution to give performances. Prioritize each in terms of its contribution to the attainment of performances and mastery of the overall accomplishment.

Step 4: Define prerequisite abilities. This step will expand the epitome by including all sub-abilities for an epitome at the first level, and then all the sub-sub-abilities for the expanded epitome of level 1 at level 2, etc.

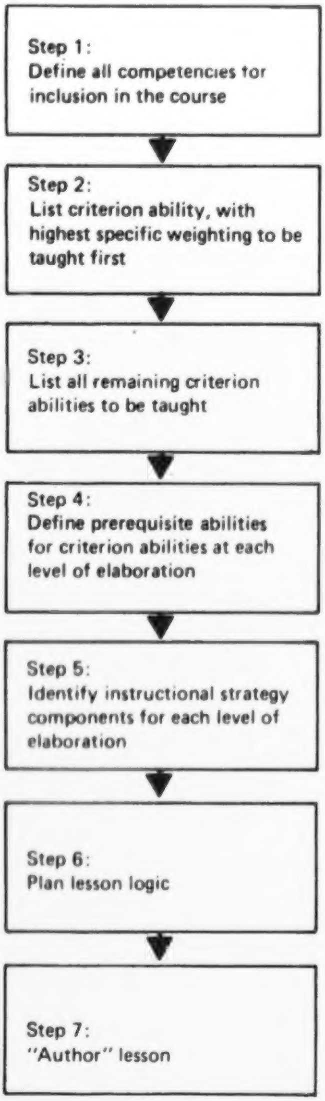
Step 5: Identify strategy components. These are: (1) an elaborative sequence of simple-to-complex idea building, relating to the particular course; (2) learning prerequisite sequences in relation to given criterion abilities; (3) summarizers; (4) synthesizers; (5) analogies; (6) cognitive strategy activators; and (7) a learner control format which enables the individual to select the content and pace of the lesson.

Step 6: Plan lesson logic. This step defines the frames and lesson logic which will analyze student responses, provide feedback for the student, initiate audio and video sequences and branch the student to other parts of the course.

Step 7: Author the lesson. Authoring means the process of programming, debugging and testing of courseware.

Figure 3

SEQUENCE OF INSTRUCTIONAL STRATEGY EVENTS



Step 1:
Define all competencies for inclusion in the course

Step 2:
List criterion ability, with highest specific weighting to be taught first

Step 3:
List all remaining criterion abilities to be taught

Step 4:
Define prerequisite abilities for criterion abilities at each level of elaboration

Step 5:
Identify instructional strategy components for each level of elaboration

Step 6:
Plan lesson logic

Step 7:
"Author" lesson

The key feature for instructional sequencing in learner-centered models is the way in which the epitome is presented and the learner-initiated responses which can be made. Individual learner aptitude features, such as high ratios of feedback for anxious students (say in a measurement course for technical teachers), may need to be made available for the learner to control. The development of an effective instructional strategy which provides information on how to match the information-processing styles of learners to the design specifications of the to-be-acquired performance abilities, in ways which provide the instructional designer with the tactical blueprints for authoring, is however still in its infancy.

AUTHORING SYSTEMS

The production of high-quality CBT material has lagged far behind the development of hardware technology in computers. An authoring language is a programming language that includes specific commands for use in CBT. In the central processor of the computer, instructions are received in a very primitive, low-level language called machine language. Because it is so difficult and laborious for people to write extensive programs in a machine language, higher-level languages have been developed. These languages use instructions written in English to create the commands. For example, READ might mean to read information from a specified device such as a floppy disk drive and DISPLAY might mean to write what follows on the screen. A programming language is a collection of rules (the syntax to be followed) and words and symbols (the vocabulary) that allow the writer to give precise instructions to a computer in a format that can be understood. The sequence of instruction is the program.

All programming languages have their advantages and disadvantages. Because they are general-purpose languages, in some cases structured around particular features of hardware systems, they cannot efficiently address educational needs such as judging the quality of a student's response. An alternative to using general-purpose languages is to design a language that can be used to write educational courses, or "courseware".

Evolution of Authoring Systems

Authoring systems go a number of steps beyond authoring languages in the capabilities they provide. Many of them like Ticcit or Wise are interactive systems which enable the courseware author, with no knowledge of computer programming, to create a multimedia computer-based lesson. Unlike languages, authoring systems offer the author additional facilities for creating graphics, animations, video and audio interactions, tests and manager systems. The idea behind the early authoring systems was the desire to separate course content from both computer programming and teaching strategies. In Ticcit the teacher was only concerned with the content, while a teaching strategy was embedded in the software – a rule-example-practice sequence which was believed to be an appropriate instructional strategy for concept learning. Thus, the author was relieved of the need to specify the detailed sequential steps for learning the concept by the provision of a "learner control keyboard" in which the pupil was supposed to decide which sequence to follow. However, since many students are not very capable of deciding their own strategies, Ticcit had to try to 'understand' what the pupil was doing and have some notion of 'approved' sequences. Ideally, more power and flexibility needed to be built into the system, if it were to support the different learning needs of students and different instructional strategy expectations of courseware developers.

Measures of Authoring Productivity

Time estimates are notoriously difficult to make for developing CBT courseware. The most widely quoted estimate is that it takes between 200 to 500 work-hours, including instructional design and postproduction evaluation phases, to produce an hour of moderately sophisticated training interaction. This estimate will vary considerably depending on the experience of the courseware development team and the degree of sophistication available in authoring tools and software. Three dimensions are critical in assessing CBT productivity potential: (a) the power of the computing system, (b) ease of use of the authoring tools, and (c) the overall output that can be obtained from authoring effort.

Power. There are two considerations in this dimension. Firstly, there is the capability of the hardware system itself. Many PC-based authoring systems, because of their lack of memory and storage facilities, allow only one person to develop courseware at a time. In comparison, supermicros with three megabytes of memory and over 80 megabytes of storage are powerful enough to support 8 to 16 authors developing CBT courseware at the same time. These systems are obviously much more productive than systems which are restricted to a single person. Secondly, power can be measured in the degree to which new operations or subprograms can be added to the operating system (Zinn, 1974). For instance, some authoring systems allow the student to access programs and data bases outside the lesson they are currently working on. Not only does this increase instructional productivity by giving access to additional resources, but it also enhances the potential for creating real-world learning experiences.

Ease of Use. This is intended to mean how fast an authoring system can be mastered by courseware developers (Fairweather and O'Neal, 1984; Hillelsohn, 1984). It can also include the ease of entry, of editing, of testing and of understanding authoring aids such as manuals and on-line help. Ease of entry refers to on-line, interactive entry. Some advance preparation of material may be necessary for some systems which require a particular format sequence. The range of entry procedures include codified systems on the one hand (e.g. Pilot) to menu and prompt driven systems on the other (e.g. Wise). Ease of editing suggests two areas: the convenience of access to the original source file and the simplicity of method for making alterations. Being able to easily check a program by executing an edit at any point in the lesson, jumping about one part to the next, and being able to quickly duplicate any procedure are powerful contributors to course-writer productivity. The third aspect of ease of use is a lot more subjective in its measurement and might be termed the frustration level. This element is determined by factors such as the compatibility between the logic of the authoring system and the understanding of the courseware developer, and the internal consistency of the program (e.g. always using the Return key as the input terminator, or presenting prompts in the same order).

Output. Fairweather and O'Neal (1984) describe this dimension as the quantity and sophistication of the graphics and text displays, logical control and analysis structures, and the scoring and logging constructs which can be produced per work-hour of effort.

These authors (Fairweather and O'Neal, 1984) have analyzed the relative contributions that different authoring systems can make to CBT productivity. A general-purpose language like Basic will be relatively high in power. That is, using the language, a sophisticated programmer should be able to incorporate most of the design of the instructional strategy and utilize most of the capability of the computer system. However, "many of the functions would require relatively herculean effort, ingenious programming solutions, and much re-inventing of special-purpose wheels" (Fairweather and O'Neal, 1984). As a consequence, courseware produced under these conditions has been technologically interesting, but instructionally ineffective.

In contrast, authoring languages like Super Pilot provide the course developer with special commands for generating text and graphics displays but are typically restricted in the amount of computer capability they access. These languages have relatively easily keyed procedures for accepting and judging student responses, and thereby increasing the overall output which can be achieved. However, as Denenberg has said about the Tutor author language, "while it is very easy for anyone to create a simple Tutor program in very little time, it is extremely difficult for anyone to write a moderately complex program using the structure afforded by the Tutor programming language. The more useful lessons require a degree of expertise not commonly found even in many professional programmers."

Authoring systems such as Private Tutor tend to be PC-based programs, menu-driven and well-prompted, and as a consequence easily learned and used. However, many of them are quite limited in the number and sophistication of displays and logical functions they support. Private Tutor provides only four screen types, Text (with no interactive capacity), True-False, Matching and Free-Response. Writing to any of these screen types is a relatively simple matter of responding to prompts. Each of the screens allow for feedback to be given to student responses and branching for remediation or enrichment strategies.

Finally, there are systems that incorporate all the advantages of the preceding three and provide for the incorporation of sophisticated instructional strategies which can be executed in a fraction of the time it would take if the routines needed to be individually programmed. Ticcit and Wise are examples of these hybrid authoring systems. Not only do these systems provide for on-line menu and prompt-driven authoring, but also two additional facilities essential to high productivity. Firstly, a sophisticated editing system which allows a production team to create and modify text and graphic material and insert additional resources such as audio or video inputs. Secondly, a course management function which provides authors with ways of collecting data on student performance. Systems like Ticcit recognize a universal lack of authoring experience and provide for instructional design guidance within the system itself. As a means of providing an interface between a coursewriter's level of expertise and an authoring system environment, Ticcit developed Adapt. At the lowest level, a novice coursewriter is introduced to a highly prompted environment that guides the selection of an appropriate instructional presentation mode and display. At the next level the same menus are used, but prompts are withdrawn. However, voluntary advice is available at any time through an advice option on the keyboard. The intermediate level generates menus of all available options and provides some complex sets of options, particularly for analyzing student responses. At the highest level, the coursewriter is assumed to be able to use the authoring language with its coding and syntax, while using menus for scoring and sequencing practice items.

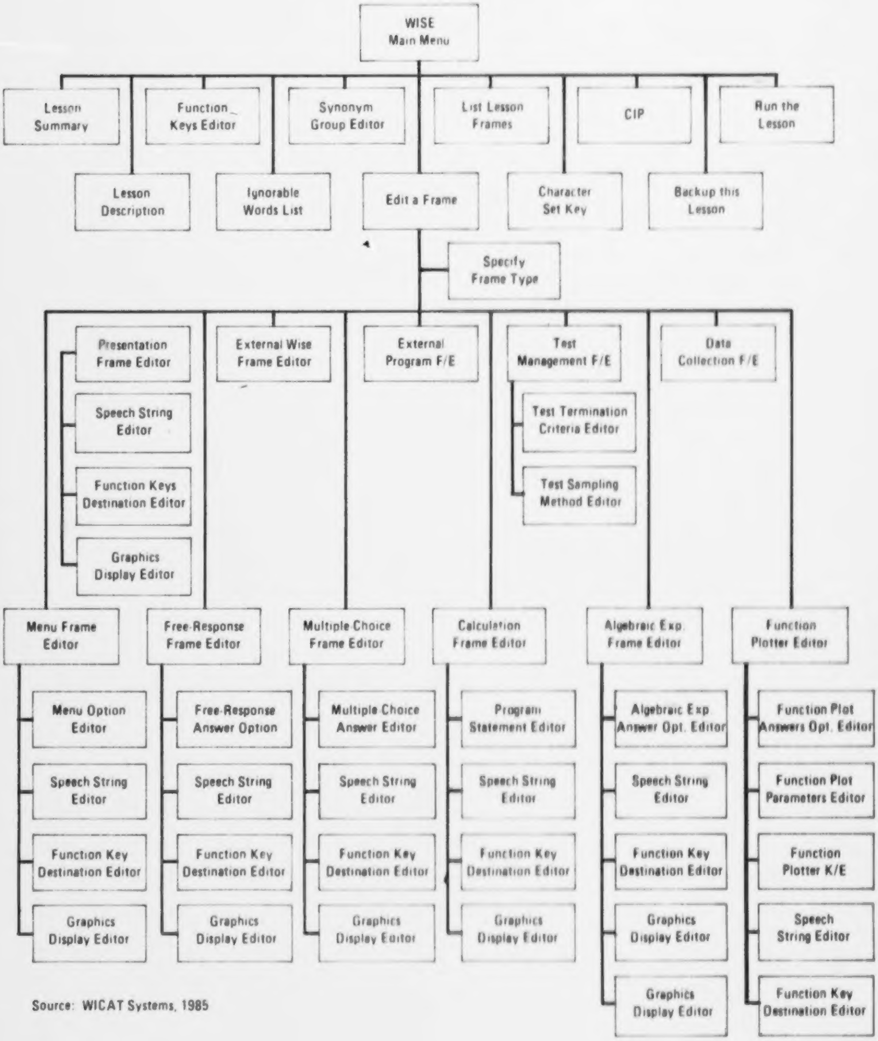
An Authoring System Case Study: Wise

The Wise authoring system is the fifth to have been developed by Wicat Systems since 1977. Wicat (World Institute of Computer-Assisted Teaching) was formed by a group of educators, instructional designers and computer learning scientists. Guided by Dr. Dustin Heuston, a successful school principal for New York who was convinced that traditional training methods could be improved, a team set out to see how the new technologies such as microcomputers and videodiscs might contribute to the development of more effective learning. One of their early successes came in 1979 with the award of a US Defense Advanced Research Projects Agency contract to develop an advanced technology training system. The outcome of this work proved that the system they had created could support the kinds of training products they wished to produce.

Like Ticcit's Adapt and Tal (Ticcit's Advanced Language), Wise (Wicat's Interactive System of Education) is a menu-driven, prompted and helped system which is easy to learn and allows a high degree of coursewriter productivity (Figure 4). Sophisticated instructional strategies involving complex displays and logic can be implemented easily and quickly. Further, as well as the range options available in the menu including a wide variety of programming utilities and tools, Wise will allow the courseware developer to interactively access other data bases or use other general languages such as Basic, Pascal or C, outside its own system.

Power. Wise is an extremely powerful system which enables the author to perform literally any function of which the computer system for courseware development is capable. However, in that the computer must be capable of addressing text and graphics material, audio, videodisc and an array of other utilities, standard PC systems have neither the computing power nor the storage facilities to address the drivers embedded within the Wise system. Consequently, Wicat built its own series of mini-frame computers based on an MC68000 32/16 bit processor. These systems, ranging from the S1250 up to the S1260 for computer-based training applications, provide for between one to seven megabytes of memory, and from 48 to 516 megabytes of data storage.

Figure 4
THE WISE AUTHORING SYSTEM


WISE Main Menu
Lesson Summary
Function Keys Editor
Synonym Group Editor
List Lesson Frames
CIP
Run the Lesson
Lesson Description
Ignorable Words List
Edit a Frame
Character Set Key
Backup this Lesson
Specify Frame Type
Presentation Frame Editor
Speech String Editor
Function Keys Destination Editor
Graphics Display Editor
External Wise Frame Editor
External Program F/E
Test Management F/E
Test Termination Criteria Editor
Test Sampling Method Editor
Data Collection F/E
Menu Frame Editor
Menu Option Editor
Speech String Editor
Function Key Destination Editor
Graphics Display Editor
Free-Response Frame Editor
Free-Response Answer Option
Speech String Editor
Function Key Destination Editor
Graphics Display Editor
Multiple Choice Frame Editor
Multiple Choice Answer Editor
Speech String Editor
Function Key Destination Editor
Graphics Display Editor
Calculation Frame Editor
Program Statement Editor
Speech String Editor
Function Key Destination Editor
Graphics Display Editor
Algebraic Exp. Frame Editor
Algebraic Exp Answer Opt. Editor
Speech String Editor
Function Key Destination Editor
Graphics Display Editor
Graphics Display Editor
Function Plotter Editor
Function Plot Answers Opt. Editor
Function Plot Parameters Editor
Function Plotter K/E
Speech String Editor
Function Key Destination Editor

Source: WICAT Systems, 1985

This power contrasts with the typical microcomputer which has between 0.128 and 0.512 megabytes of memory and 0.360 to 20 megabytes of storage. An individual piece of courseware such as English as a Second Language (ESL) in its early versions may take up to 40 megabytes of storage. Add 12,000 graphics from a reading program and the storage requirement jumps to 76 megabytes. Multiple courseware systems which are typical packages in Wicat's computer-based education program mean that the minimum hardware configuration needed to run the courses is not less than 160 megabytes of storage and 3 megabytes of memory (Heuston, 1985). In an authoring configuration for CBT, even the smallest system (the S1250 with three megabytes of memory and an 86 megabyte hard disk) will allow 8 or 16 authors to work on one course, or to develop 8 to 16 courses simultaneously. This is a very significant consideration for CBT productivity.

The basic unit of instruction in Wise is called a frame. A frame may be accessed and developed at any of three different levels of authoring complexity.

Level One. This is a highly prompted set of menus. No computer coding is required. Many authors using the system never go above this level in developing their CBT lessons.

Level Two. This level involves the use of the calculation frame. Within this frame the author has access to an authoring syntax which allows computations, creation of animated displays, conditional branching, use of system variables, acceptance of open-ended student responses, answers judging the quality of students' responses, calling the logic and display of other lesson frames as subroutines (nested at any level), control of external devices such as videodisc players, manipulation of common variable pools accessible to any set of users, and many other functions. The calculation frame syntax is a powerful authoring language in its own right, and just as entire lessons can be written without access to any calc frame, most lessons could also be written using only calc frames, if so desired (Fairweather and O'Neal, 1984).

Level Three. Any lesson frame may be designated as an external frame. When the student is branched into an external frame, Wise will execute any program or operating system named in the frame. This may range from using a program based on an operating system like Pick, to languages such as Basic, Pascal or C.

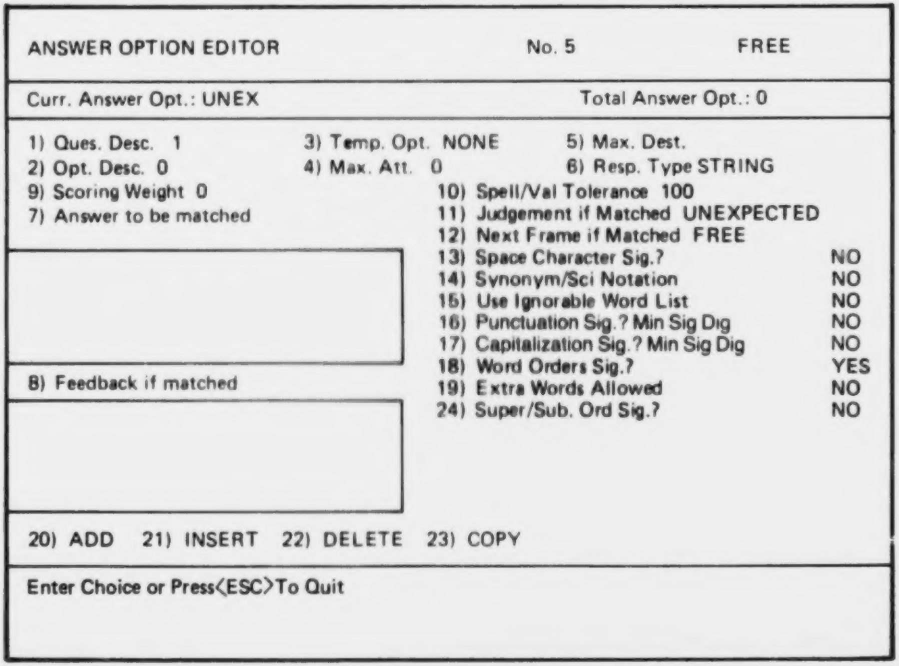
Ease of Use. In terms of ease of entry Wise facilitates the process by providing two entry points. First, the display screen contains all the instructional material visible to the learner. The author creates all text, graphics and animations through simple two-keystroke commands. For example, the keystrokes CT (create text) tells Wise that the following input is text material to be displayed on the screen. These keystroke commands can be further simplified by using a single keystroke on the alternate key pad. In this mode the key 8 can replace the two keystrokes C and T. Graphics can be created by using two-key commands or alternative single function keys. For example, to draw a box (using an IBM PC keyboard) the author would press the "-" key to create the box graphic, and then manipulate this image in terms of size and shape by using the arrow keys. To animate an object after it has been drawn on the screen, the author uses three commands: "user create" (UC), "event create" (EC), and "path create" (PC). For each of these commands Wise will prompt the author for information such as "Do you want to rotate this object?" "What path do you want it to take on the screen?" "Do you want it to leave a trail as it moves about the screen?" Using these simple keys it is possible to create quite complex animations in only a matter of a minute or two.

The second point of entry is to structure the logic of the lesson, that is, to structure the sequencing of frames, the judging and scoring of student responses, and selecting utilities to be incorporated within the lesson like videodisc and speech sequences. Each display frame has a number of logic menus which allow the author to tell Wise how he or she wants the particular frame to fit into the lesson as a whole. For example, option 6 on the Presentation Editor Menu will prompt the author for the "name of the next frame". The author will respond by typing in the name of the next frame that the student will go to (Figure 5).

At any stage of courseware development the author can run the program in a "debug" mode. This is the manner in which the student would view the lesson, except that each frame name appears at the bottom of the screen so that the author can identify those which need further editing. If the lesson contains a bug which would prevent the lesson from running properly, Wise will terminate the lesson and give an error message describing the problem and identifying the name of the frame where the problem has occurred. A typical message might read as follows. "An error has occurred in Wise 2.2.2. It has occurred at station #6. The error is in the lesson named DAFT at menu response. But the string does not match a menu option. Please report these numbers ER=423 SN=21001004 MG=240. The process was terminated with an error." (The reference number alerts Wise Customer Support Service to identify the specifics of the problem should the author not be able to fix it.) Editing a display frame is further simplified by the facility of Wise to label every object that appears on the screen. All that is required is for the author to type in a command (e.g. OD - object delete) and Wise will ask for the name of the object (its identifying letter) to be modified.

Figure 5

WISE'S ANSWER OPTION EDITOR



```
ANSWER OPTION EDITOR                          No. 5              FREE

Curr. Answer Opt.: UNEX                            Total Answer Opt.: 0

1) Ques. Desc.  1             3) Temp. Opt.  NONE         5) Max. Dest.
2) Opt. Desc.  0              4) Max. Att.  0             6) Resp. Type STRING
9) Scoring Weight  0                      10) Spell/Val Tolerance  100
7) Answer to be matched                   11) Judgement if Matched  UNEXPECTED
                                          12) Next Frame if Matched  FREE
                                          13) Space Character Sig.?              NO
                                          14) Synonym/Sci Notation               NO
                                          15) Use Ignorable Word List            NO
                                          16) Punctuation Sig.? Min Sig Dig      NO
                                          17) Capitalization Sig.? Min Sig Dig   NO
                                          18) Word Orders Sig.?                  YES
8) Feedback if matched                    19) Extra Words Allowed                NO
                                          24) Super/Sub. Ord Sig.?               NO

20) ADD    21) INSERT    22) DELETE    23) COPY

Enter Choice or Press<ESC>To Quit
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Output. The Wise philosophy is that once a procedure has been created it should never have to be created again. For example, when an author makes a graphic which may have to be used again, that graphic can be stored in a graphics library and accessed at any stage of the lesson development, or at any stage in the development of any other lesson. Whole display frames and frame logic can be copied from within the current lesson or from another lesson.

Some frames such as the Free Response may require a huge range of student responses to be judged. For each category of answer, an answer option file has to be completed by the author. Much of the information will be common to all answers, such as the significance of word order (18) and spelling/value tolerance (10). These criteria provided by the courseware developers can be templated once and copied for use time and time again. Each answer option can then be quickly tailored for the unique responses and feedback that individual learning strategies may require.

Although all the courseware can be developed in noncoded structures, some authors with sophisticated programming skills may want to use calculation frames to write original sequences. Once written, these can be made available to other nonprogramming users via the normal menu and prompt system. This facility greatly enhances the quality and range of output accessible to all authors.

Systems such as Wise offer instructional designers and training resource managers not only the possibility of designing and delivering sophisticated learning environments, but also the management of information such as student performance, lesson data, score averages and the like, which contribute to the rigorous monitoring of student learning progress. Such computer-managed instruction (CMI) makes the product not only an effective method for delivering training, but also for controlling the managerial consequences of CBT interventions.

Although Wise courseware development is authored through powerful minicomputers such as the Wicat S1255, the lessons can be disseminated either through terminals linked to the minicomputer, or through stand-alone PC microcomputers. This means that lessons can either be used in formal classroom training environments, or in less formal and distance learning situations. In the PC mode, lessons are downloaded onto floppy diskettes by an emulator program. With the most recent versions of PC Wise, drivers can address a wide range of enhanced graphics PC systems, giving 16 color output. For the price of a PC microcomputer, students can access a level of program sophistication which only a few years ago was beyond even the most expensive mainframe systems.

THE ADVANTAGES OF CBT

"In the United States, between 1950 and 1975 the percentage of the gross national product spent on education rose from 3.4 to 7.4 per cent, an increase of 118 per cent. During this period, measurable benefits from this investment appear to be negligible. Generally speaking, student scores went down. In other words, having more than doubled the expenditure for the educational delivery system there was no improvement" (Heuston, 1985). Computer-based learning systems offer the promise of delivering greater levels of learning achievement, more professional teacher involvement and higher pupil-parent satisfaction from education and training than at any previous time. Greg Kearsley (1983) has identified the several benefits likely to flow from CBT implementation.

Increased Control. Many organizations expend considerable sums of money in developing courses to train staff. However, turnover often magnifies the cost that would be incurred if the course were to run each time new staff were appointed. Also, trainers receiving the material modify it in the light of their own experience, sometimes improving it, but often reducing its instructional effectiveness. With CBT, the cost of mounting a training program is negligible, and with PCs the need for expensive outlays associated with formal training (travel, accommodation, etc.) is significantly reduced. Further, the quality invested in the initial development is not going to be dissipated by random modification or cost-saving reduction in its content. Quality control is enhanced through the computer's ability to score and monitor student progress objectively and highlight deficiencies in instructional strategies.

Reduced Resource Requirements. CBT can generally achieve learning in a much shorter time than conventional methods. With systems which use inexpensive floppy disks, there is no limit to the number of students who can be engaged in the learning without highly paid instructors. In some cases, where the cost of equipment may exceed the cost of training staff, CBT programs with sophisticated simulation procedures may make it possible to forego the expensive equipment. More money can thereby be dedicated to upgrading teacher resources.

Individualization. One determinant of learning is the degree to which students are able to work at their own pace and receive feedback most useful for achievement. Heuston (1985) has reported that depending on the length of the school day and the traditions of school, only about 28 per cent of the total delivery time is spent in instruction (or about 92 minutes a day), and of that time, at best 120 seconds may be individualized for a student. CBT allows for 100 per cent individualized instruction, and with some systems, learner-controlled instruction.

Timeliness and Availability. A common problem in training is that it often cannot be provided when and where it is needed. Because of the lack of qualified trainers, equipment, teaching accommodation and other resources, trainees are forced to wait. Sometimes, when it is essential that the trainee takes up the job because of overall manpower considerations, in the absence of appropriate training provisions, either poor on-the-job teaching is offered, or no training is provided at all. This is an area in which CBT has a tremendous potential for providing training on demand.

Reduced Training Time. The capability of CBT to reduce training time is one of its most frequently published attributes. Studies reported by Kearsley (Orlansky and String, 1979) demonstrate that while the actual range of saving may vary considerably, the median value is about 30 per cent. If time saving can be of this order, considerable saving is likely in increased trainee productivity, reduced trainer salaries, and reduced needs for large and costly training infrastructures.

Improved Job Performance. Because of the interactive and individualized nature of CBT, its inherent potential to improve the quality of training is significant. Under conventional conditions, students can avoid attending to the instruction for large periods of time. But, in interactive individualized instruction, the learner is forced to engage in the process by the very nature of the delivery system.

Convenience. Computers are becoming increasingly common in everyday work places. As a consequence, it is becoming possible to "embed" the CBT program in the work system. For example, project managers required to supervise accounting procedures may have an instructional package on accounting procedures loaded into the accounting program.

Change Agent. People need to be computer literate today if they are to succeed in a technological environment. CBT is part of the process of providing that literacy across all content areas.

Increased Learning Satisfaction. Because of the nonthreatening, interactive and achievement-oriented nature of CBT, students typically find it more motivating than other forms of instruction. One of the major reasons for student disenchantment with learning is previous, and often, continuous failure. Nothing breeds successes better than success itself. The computer never gets bored with students, nor impatient, no matter how many times they make a mistake; the chances are they will want to learn more.

Reduced Development Time. As technology changes, so too will the need to constantly update training programs. Until recently, revising materials in CBT programs was an extremely costly process. However, with the editing facilities now available with authoring systems, the revision process can be quick, and deletions and insertions of content streamlined. Coupled with the feedback that embedded test facilities can provide, not only can content be changed to meet changed circumstances, but also the quality of the instruction itself to meet increased understanding of the human information-processing system.

CONCLUSIONS

In the early days, it was thought that CBT and its attendant philosophy of individualized learning would be so irresistible that, as Bunderson put it, it would "alter the culture of the school". It never happened. In fact, only in those circumstances where teachers have been prepared to accept the computer as part of a teacher-centered classroom culture, has the revolution flourished (Wilkinson and Patterson, 1983). Teachers, hired for their pedagogic ability rather than any particular interest in computers, are trained in the application features of the system rather than anything about the computer itself. Computer studies are left to the teachers who are experts in computer programming.

But the revolution will change teachers, at every level of the system. It will never replace them. Teachers may not need to be experts in computer programming, but increasingly they will need to become aware of, and experts in, the science of instructional design and development. And for those who accept this incalculable resource in their classrooms, workshops and laboratories, their teaching role is likely to be much more dynamic, professional and personally satisfying than at any time in the history of the profession. They will finally have at their disposal the means to ensure that every individual achieves in ways never before thought possible.

Development and Utilization of Software

Robert McCaig

There is an assumption in this paper that there is no need to cover the ground on such prior issues as instructional objectives or of testing procedures which must be linked with teaching software. The economic aspect of software production is an overriding factor and so the alternatives in software will be examined largely from this stance.

Cost-effectiveness can only be measured in relation to goals achieved. Goal achievement similarly cannot be measured in terms of the number of teaching modules produced. If it could be, Asia could rest on its laurels, since, largely because of the predilection of UNESCO, the Colombo Plan Staff College and other international agencies for this kind of software, the Asian continent already bears a sizeable weight of paper utilized for this form of software.

The test of cost-effectiveness can only be in terms of the extent to which the software is used by teachers and it is effective in promoting learning on the part of students. We really cannot decide this, and so a good cost-saving project might relate to research on the software which has been produced and the effect and benefit it has had.

The Colombo Plan Staff College has one indicator of its own success in the production of teaching software. It has devoted a considerable part of its resources to the development of modules and other print material. The material is generally given away free to those professionals who seek it. The material is largely directed to the client group of technical teacher trainers. As Director of the College for the past two years, the requests that have come to me for such materials would be well below 20 in an organization servicing 17 education systems. When we recently moved the College from Singapore to Manila, truckloads of such paper were sent away to the recyclers.

It might have been that we overproduced or that the quality of the software was poor. It might have been because teachers and national systems are not yet prepared to accept software designed for a multinational client group, even though the international agencies see this as the cost-effective answer. It might have been because teachers, by long tradition, feel that they are masters in their classroom or that curriculum developers have a priority interest in holding their jobs and it becomes essential for control of software to remain in their hands. Certainly, as a university teacher, I never felt that materials available on the open market ever met my particular requirement. I read widely and stole ideas from authors unashamedly, but somehow felt I had to leave my mark on the materials which went into the hands of my students.

In the Asian context, where texts and materials are usually centrally prepared, one would expect another phenomenon to be present. This is a very long period without changes in the use of coursework materials. The links between initiating ideas on new software, gaining academic and financial approval, and producing software are unclear and time-consuming.

This essential conservatism, the strong desire to stay with what you have yourself produced or used, or what through long usage you have become familiar with, explains the dismal history of a whole range of software and teaching aid – audiovisual materials, programmed learning packages and, I suspect, modules. Anyone connected with education over some years is familiar with the succession of new teaching materials and approaches. They arrive, they receive high praise, sometimes they are purchased and stored, sometimes they have a brief honeymoon period of usage, and are then discarded. It is not a question of poor quality or of inadequate conceptual framework; they can be very good. In most educational institutions you can find cupboards full of such educational artifacts. The problem of insufficient utilization is the high hidden cost factor which must be faced.

Two questions need to be answered when assessing cost-effectiveness and economic utilization of resources: Will teachers use them? Do they effectively promote student learning? If the answer is "yes" to both, then high initial investment costs are justified; if it is not, there can be no way of justifying cost however low, though remedial action might be possible, and this will be referred to later. Software production is not an open-ended or cheap activity. Any software requires a high level of human input. Hence the need for some prior knowledge on utilization seems a necessary prerequisite to the production of any software.

The Teacher

The boundary between software and hardware is not quite clear. In the absence of clear boundaries, it is suggested that the first type of software to be considered ought to be the teacher, in this case, the teacher trainer. The well-trained teacher is the most effective and most cost-effective software available. Initial training costs might appear high, but this ignores the economic fact that well-trained professional teachers are a self-renewing software. They never get out of date because, as professionals, they try to stay abreast of what is taking place both in the discipline area and in pedagogy. They have an active life of 25 to 30 years and so have an impact on many generations of students. They are capable of research and so of enhancing the knowledge bases on which technician education is based. Additionally, in the course of teaching life, they generate very low-cost software which meets the day-to-day requirements of students – a perpetual software production center maintained by the use of libraries, attendance at conferences, industrial revisits and other forms of self-renewal. It pays to have a high initial investment in the training of such teachers and also some low ongoing support to maintain enthusiasm for self-renewal.

Teachers and bureaucrats keep making public statements about the costs of technician education being too high. Certainly poor technician education is expensive out of all proportion to its limited worth. What is the right level of expenditure for technician education and particularly for training the trainers of technicians? How is it determined in relation to other social services – to soldiers and the whole apparatus of defense systems that never fire a shot in anger, to maintaining prisoners or hospital patients who are the victims of socially induced diseases caused by smoking or drinking or drugs? All the indicators are that well-trained professional teachers are inexpensive by comparison and that public statements ought to forget the notion of high cost and start an insistence on provision of funds adequate to ensure high quality.

The Student

A second area of software relates to students. It is interesting that neither "student" nor "learning" appears high on the agenda of our concerns. This is not uncommon. The order of things, particularly in the Asian region, appears to be buildings and equipment with high priority, then curriculum, followed by teacher training, information systems and other issues coming on line in various orders. The student is, however, the second half of the education equation. One should agree that he should be the first. The system exists to service him. If he does not learn, no matter how good the supporting software is technically, the cost is prohibitive and a complete waste. The able but failed student, the ill-trained student, is a major cost factor, both directly and in terms of lost opportunity costs. There is an assumption that there is an automatic and positive response from students to whatever is put before them: learning automatically takes place. Yet research on adolescents and young adults in Europe and North America has demonstrated very clearly how tenuous is the link between teaching and learning. All too often little learning or at best shallow learning takes place. We do not know if Asian students respond in the same way as their European and American peers because of the general absence of research in the area. In the western experience, money spent on training students to learn effectively and trainers to better appreciate the learning set of the young adult has led to both qualitative and quantitative improvements in a significant way. This is because a well-trained student, like a well-trained trainer, has the capacity and motivation for lifelong learning, a highly desirable asset for the technician facing fast industrial changes. It may be considered that teachers and students are outside the scope of a definition of software, yet as they are both the highest-cost and often the lowest yielding components, the effort to achieve more cost-effectiveness must start with them.

Conventional Software

Turning to more conventional definitions of software, it is not proposed to look in detail at the total range. Rather, the criteria of selection have included low cost, current usage and potential for more cost-effective usage. There is no doubt, for example, that laser discs with their potential for almost limitless information storage and retrieval capacity are not high-cost software on any criterion of value for money, but other factors keep them out of consideration. The first is that information availability or scarcity is not a problem. There is a surfeit of information in more readily available forms which is not effectively utilized now. A second point is that, as a teaching machine it is one of a succession of such equipment most of which, in spite of their undoubted quality, is not well used. Its introduction to the region should therefore follow and not precede a definite change of attitude on the part of the trainers in the more advanced countries of the region.

Present availability, low cost and current usage certainly apply to blackboard and chalk or whiteboard and pen so they must be regarded as major items of software. The blackboard or its equivalent has survived many generations of teachers and there appears to be no immediate likelihood of its going out of use. Nor should it, since it is very useful in elucidating arguments, demonstrating processes and summarizing. Yet too often it is neglected, badly maintained and poorly used even though its maintenance is cheap and easy. Its use ought to be a part of lesson preparation. In fact, a blackboard plan is as important as a lesson plan since it is a major visible component of a lesson, one which students are likely to retain far longer than the spoken word. Overhead projectors offer a mechanically advanced version of the blackboard, but again are poorly used, with too much detail and unreadable writing. The full potential for using overlays is also rarely exploited. All three, blackboard, whiteboard and overhead projector, are simple, cheap, durable teaching software, but effective usage cannot be assumed; teachers need specific and ongoing training as well as supervised practice if good utilization is to be maintained.

The printed word is the most ubiquitous and durable software we have. This is its strength and its weakness. Probably it has been overused and our expectations of it are too high. Where photocopying of books and journals is readily available and cheap, there is a widespread student belief that photocopied material stacked on a desk or carried under one's arm is the equivalent of knowledge in the brain. Regrettably for them there is as yet no process for the transformation to take place except through the students' eyes and with the active involvement of the brain. Similarly, librarians and academics generally regard the presence of a good library as evidence of a good academic institution. My impression, in traveling in the region, is that libraries, including the Colombo Plan Staff College Library, are more looked at than looked into. There are some sound reasons for this; their further consideration is essential. To date they largely remain a huge potential. Used well, they provide the good teacher and the motivated student with opportunities to transport their thinking beyond the formal constraints of the classroom.

Language

Two factors have to be recognized and addressed. Few countries in the region have any long tradition of the use of the printed word, at least among the levels of the populace from which our technicians come. Secondly, English is now the major language of science and technology writing. This is recognized in many countries in the region, and in these countries a high proportion of the volumes in the technical libraries are English language texts. There is also a fairly uniform response to my questions about the usefulness of these books in countries where English is, at best, a second language or a third: the courses are taught in English in the upper levels. Unfortunately, if you have the bad habit of wandering through libraries and seeking out evidence of book utilization, you will find minimal utilization both of the books in English and also of libraries in general. The standard of English used by the lecturers is often very low, so that what the student gleans from this ineffectual use of English in lectures and texts must necessarily be low.

This is not meant as an unkind comment; there is no reasonable justification for such people to be highly proficient in a foreign language. The writer would be among the heaviest of sinners in this regard. What we are looking at, however, is the production and utilization of inexpensive, cost-effective software. Libraries can be the answer, but strong remedial action needs to be taken. The simplest and most obvious answer is to translate the texts into the first language of the country.

This is expensive and time-consuming, and only nations like the Soviet Union with its vast resources and its high emphasis on information retrieval seem to be willing to carry on such sustained programs. In terms of technological advances the policy has paid off handsomely. An alternative is for local academics to analyze and synthesize the materials and to produce sets of texts in the local language for student use. This requires a good knowledge of English as well as content. It is done to some extent. However, the volumes of such lecture notes are surprisingly thin, and this causes doubts as to how courses of considerable complexity can be accommodated in these slim volumes, which are also usually poorly printed and presented. The third solution is that adopted already by some Asian countries and this is to make English a primary language of instruction beginning in the primary schools. There is no one right solution, but the crucial issue is of more effective utilization of the library resource, which is at once expensive, because of escalating purchase costs, yet inexpensive because it can accommodate many student needs over a number of years. We must continue to recognize, however, that there is a limit to the effective shelf life of a high proportion of books.

Libraries

A second point relating to libraries relates to student use. Libraries, as they become information centers utilizing a variety of information sources, are becoming very complex. In the west it has been found essential to train students in library usage, even at the postgraduate level. Like use of the blackboard, library usage needs constant practice so library exercises need to be incorporated in each course so that usage over several courses and several years provides a familiarity which leads to automatic acceptance of the library as a tool.

Course notes are both popular and useful software. Much has been done in the region in the development of modular material and a reference will be made to this later. My most sustained experience with course notes was as a university teacher in a community which provided services for both full-time and distance education students. For many years I had postgraduate classes where the ratio of full-time to distance students was of the order of 1:2, so much of the focus had to be on the preparation of materials for the off-campus student. As the students were persons already employed as teachers in universities and colleges, and the courses were about effective university and college teaching, the students were very strong critics and so one learned the difficulty and complexity of writing such material very early in one's career. When one student misinterprets course notes this can be put down to student stupidity, but when five or six misinterpret the same material one is less willing to identify who is stupid.

Open universities with high student enrolments and the opportunity for recovering course material costs can and do employ teams of subject, graphics, curriculum and sometimes media specialists to produce very professional course materials. This approach has its strengths and weaknesses. One of the possibilities for addressing the problems of staffing the technical teacher training colleges which are opening in various countries in the region might be an open university providing good course materials as well as good teaching by the distance mode. Unlike some open universities already operating in the region, one would hope for a student focus and a focus on the production on a cost-effective basis of quality graduates. This would necessarily require the highest of standards of faculty and course materials. The training of teachers, because of its multiplier effect and the need to be a model of what should be done, must stress quality in all things.

More importantly, all potential teachers need to be trained in the skills of writing course material and lecture notes, the preparation of illustrative material such as charts and diagrams. Most teachers err on the side of too much detail and complexity, whereas the ideal is shortness and simplicity, utilizing simple illustrative material to give visual support to the ideas expressed. Sustained hands-on training experience is needed as part of a student's preparation for teaching. All materials, whether for open university or for classroom use need in-built self-destroying mechanisms so that the hard decision of determining obsolescence is not left to the author, particularly those authors who have invested a considerable part of themselves in the development of the materials.

Asian Texts

As a pathway to quality the idea of Asia-wide texts has often been discussed. The potential market is immense; much basic educational training material seems to have sufficient common ground; the economies of scale and the chance to draw on the best available talents – all of these are very appealing, particularly to persons working in organizations with a multinational client group such as UNESCO, ILO or the Colombo Plan Staff College. A textbook, accompanying workbooks, books of associated readings, and a teacher guide are seen as the four major components of a kit. In every aspect except one it is a highly desirable concept since it addresses the issues of quality and price very effectively. The one problem that has been referred to earlier is the question of "ownership". Good materials exist but national education systems and individual teachers, where they have such discretion, show little inclination to use them.

With materials of this kind produced by the Colombo Plan we have found that there is at least one major step beyond production of the material. The College has a set of excellent modules on training field researchers. Calls for copies have been few indeed. Our success, however, has been to run courses to teach the teachers how to use the modules. Once they have a stake in "ownership", in familiarity with the materials, we consider a multiplier effect is more likely – and there seems to be some evidence of it.

This research trainer program is a set of modules and it constitutes one of a series of modular approaches adopted by the College. Training programs have been held for training module writers and continuing consultancies have been established with some countries to help in the production of modules as part of a sustained curriculum development. As with other types of software the relationship between investment in training of module writers and the production of good modules is self-evident. There is also another point implied in the previous paragraph. This is the need to train teachers to use the modules produced.

This review has suggested nothing new. It has premised that simple "software" which teachers have consistently used is the launching pad for future developments. Again there is no suggestion that new knowledge or new technology is needed to address the issues of the topic. It is suggested that an emphasis on training and retraining, emphasizing quality, will produce the most cost-effective improvements in technical teacher training. Investment in high quality initial training with further recurring investment in retraining the trainers would seem to be the top priority.

Computer Software

Let me finally turn to the more specific current meaning of the word software. This is as it relates to the computer. Of all the generations of teaching machines the personal microcomputer would appear at this stage of development to have more chances of acceptance than its predecessors. Man seems to be in love with machines and is fascinated in the initial stages when novelty has attraction. Once further intellectual input is required, as for example, when its use requires departure from accustomed behavior or when maintenance becomes a problem, in the past the story has been that the interest dries up.

The microcomputer has some advantages over earlier machines in that there seems to be a greater level of readiness on the part of society to accept it. Computers have moved from awesome wonder machines that only the highly trained specialist could face to the point where, in many countries of the world, they have become birthday gifts for children. Whereas in the past technology came down from the top, the expert trying to impress on the teacher the value of the machine, now the student is the computer user and the teacher in the position of chasing after the student in order to maintain his status. The student, using computers as game machines, comes with no fears of ignorance or feelings of lack of ease with the equipment. These are factors which have inhibited older people in the use of such technology.

The other important revolution which sets computers apart is that, for the first time and on a very large scale, teachers and other computer users are willing to use other people's software. We have passed the stage where, a few years ago, the purchase of a computer implied the employment of a couple of programmers to write software according to the specific needs of the purchaser. The trend now is for purchase of off-the-shelf software and computer shops everywhere are crowded with people seeking out the latest on the market. This is a highly significant development which is completely at odds with the concept of "ownership" of one's teaching materials which was referred to earlier.

The apparently simple software is the outcome of intensive and expensive research and development; the age of the amateur, except in an interactive role, has passed. All of this has come to receive wide acceptance and so the chances of its use seem high. Interactive software – and software here refers to the floppy or hard disc – whereby the teacher can still have a measure of control over the academic content of a disc will give teachers a measure of participation and, what is likely, their participation will be structured within the boundaries of sound course design principles. One problem remains and in this history is repeating itself. This is that the hardware is here and fairly widely available even in some of the less-developed countries; the human element, the development of adequate training programs, lags far behind. Success and full utilization will depend on effective training.

There is no magic new educational development which will lead more effectively to the achievement of desired goals than the potential of the technology we now have. The software – mostly human-driven – the hardware, and the conceptual bases to achieve the goals already exist. The problem in the past has been the poor support given to the human component, which is the overriding factor in the successful training of technical teacher trainers.

The Asian region has been ahead of many other parts of the world, including many advanced nations, in recognizing the need for effective technical teacher training. And it has also gone well ahead of many countries in seeking support for the physical facilities to support such training. Yet there has been an uneven approach to the problem. Often, physical facilities are present but underutilized. Secondly, training money has been used disproportionately. There is merit in giving advanced training to relatively few people in western institutions, people who might be regarded as resource persons and leaders on their return to their country. This must be matched, however, by providing adequate resources for training the great majority of teachers within the region or within their own countries. Too often the overseas qualified persons are able to opt out and get more remunerative employment outside the technical education system. Too often after their return they are swallowed up by their education system and their particular expertise underutilized.

The major area of need, however, is the local training of technician trainers. In several countries only minimal resources have been provided for the professional development of technical teacher training college staff. The urgent need, therefore, is to recognize the high investment return on the well-trained trainer and the disastrous consequences of inadequate support for the initial outlay. The urgent need is to provide sufficient resources both for upgrading of existing personnel and for the aggressive recruitment and training of new personnel, so that a firm base for the technology pyramid can be established. Without it the rest of the structure, and particularly the support for industry, will be ineffectual.

The Scope for Technical Cooperation Among Developing Countries

Ray Powell

Reviewing technical cooperation among developing countries in the field of technical teacher education is fraught with difficulties, if only because of the near-complete absence of reliable data. Where information does exist, it is not readily accessible at a national level, but usually remains the closely-guarded property of specific institutions and individuals. The lack of a regionwide information network guarantees that experiences gained and lessons learned are to some degree wasted. The equation seems to be simple. Increase the information flow among countries about their technical teacher education initiatives and the *scope* for technical cooperation will correspondingly increase. The stress on "scope" is deliberate, because additionally there need to be organizational arrangements to ensure that cooperation does actually occur.

This paper highlights some models to demonstrate the scope for cooperation and as well some successful approaches to initiating cooperation. In addition, it identifies some interesting technical education initiatives undertaken by individual countries and examines organizational structures that might facilitate the needed information flow.

If the title of the paper seems to imply that little cooperation has taken place so far among developing countries, it is a mistake. Since 1975 the Colombo Plan Staff College for Technician Education, located earlier in Singapore and now in Manila, provides an excellent example of what can be achieved in cooperative technical teacher education. Established primarily to provide assistance to member countries in the improvement of their technician education system, the College quickly identified technical teacher education as the focal point for its efforts in both its first and second year plans. Given the large number of potential clients, it chose trainer training as the most appropriate methodology to ensure the greatest impact in its member countries. Training technical educators, it decided, would accelerate the training of technicians by enabling member nations to develop their own national programs for technical teacher development.

As a means of promoting technical cooperation among developing countries, the College is unique. All member countries, no matter how small, contribute to the funding of the organization according to a formula determined by the latter's Board of Governors, based on the countries' per capita GNP. Although a "core faculty" exists, paid from the annual College budget, many countries supplement their annual contributions to the College by providing additional faculty at their own expense. This is seen by these countries as specialized staff development for their key technical teacher educators as much as additional assistance to the College.

In 1983/84 an international team conducted a comprehensive evaluation of the College and reached some conclusions about its role and functions.

- The regional clientele and international faculty have not created the difficult problems usually associated with heterogeneity.
- The diversity of clientele and faculty has contributed to a broader understanding of technician education, through the exchange of information and synthesis of approaches to problems of individual countries.
- International governance enables the College to perform functions national institutions cannot easily duplicate: concentrate on problems common to all countries of the region; undertake regional surveys and studies; convene regional conferences and seminars; and encourage regional exchange of information.

In other words, the College has achieved synergy – the member countries have committed staff and resources to produce an organization which, on their own admission, is more capable of servicing the needs of their technical teacher education system as a whole than the constituent parts they have contributed.

So in the College we have a successful model of cooperation in the field of technical teacher education. Outside of technical teacher education but still within Asia, we can see other examples of the same model such as the SEAMEO organizations, RELC and INNOTECH, and the Asian Institute of Technology.

Other models exist. The Commonwealth Fund for Technical Cooperation is set up under the auspices of the Commonwealth Secretariat, to represent the interests of British Commonwealth members in furthering mutual cooperation. The Fund receives the bulk of its funds from four developed member countries and adopts the role of a broker-cum-underwriter, assisting one country to identify its training need, then locating a potential provider of the service in another, and finally funding the project. What has been the regional impact of this model of technical cooperation by sponsorship? Most markedly, it has produced a number of institutions of technical teacher education which are the equal of any in the developed world, such as the Technician Teacher Training Institutes in India. The Fund's role in promoting these institutions in the eyes of the international community has contributed greatly to their prestige and encouraged developing countries to evolve their own local models for technical teacher development.

A third model of technical cooperation is that of two or more similar institutions joining together for a mutually beneficial project. It is not essential that the goals of the joint venture should be identical for each partner, as the following example will demonstrate. The directors of two large technical training establishments, one in Thailand and the other in the Philippines, met some years ago at a conference: one had an effective center for the development of technical teaching aids on his campus, but no funding for higher education of his staff, while the other had a successful Masters in Education program but had no capability in providing the polytechnics, his clients, with training to develop engineering teaching aids. Through a type of countertrade requiring little hard currency, both institutes were able to meet their needs.

Beyond these three models, it will be useful to identify some interesting initiatives in technical cooperation in teacher training. The first of these was a learning resources development project initiated by the Colombo Plan Staff College in 1983. The College recognized the priority need of technical institutions to develop learning resources, and initiated a development project to promote collaboration, optimize the utilization of scarce resources and establish a continuing system of cooperation through a consortium of regional institutions.

As a first step, the College gathered data by means of a questionnaire. Technical institutes were asked:

- to indicate the urgency of different types of learning resources, considering the available hardware and the level of educational technology;
- to assess the urgency of need for textbooks and workbooks in the different technology areas; and
- to indicate the availability of textbooks and workbooks in the different technology areas.

Following the survey, the College organized a workshop, to obtain the commitment of the attending countries to a long-term project and to get each attending institution to identify a learning resource in a specific technology area which it was prepared to develop over a specified period of time, given some limited financial assistance from the College. Six months later a second workshop was held where participants brought with them their finished products. The participants were introduced to the concept of resource validation, and validation proformas were actually produced. The learning resources have since been validated, rewritten where necessary, and replicated and distributed with the assistance of the College. An indirect by-product of the project has been a widespread program to train technical teachers in writing teacher manuals and student workbooks.

Some other interesting projects, which have taken place and already involve considerable regional cooperation, include the following:

- Development of methodologies and guidelines for policy analysis and policy formulation in technical education, sponsored by the Colombo Plan Staff College;
- Under the auspices of the Asian Development Bank, the development of methodologies and guidelines for educational project benefit monitoring;
- In conjunction with UNESCO, an analysis of current, and an examination of possible future approaches to the training of maintenance technicians;
- Development of a series of case studies documenting successful models or examples of industry/institutional collaboration, sponsored by the Colombo Plan Staff College; and
- Development of training modules on strategic planning for the management of technical education in regional countries, as well as a series of relevant regional case studies to which strategic planning techniques and principles can be applied, also sponsored by the College.

There are also national initiatives about which there is generally little knowledge outside of the country involved:

- Korea has been involved over the past five years in some extremely interesting research on the development of national trade or vocational testing standards. Singapore has also done work in this area and developed a system which provides recognition for tradesmen who have learned their craft informally or on the job.
- The Philippines and Thailand are well advanced in the development of training materials for workshops designed to train the writers of instructional modules.
- India and Thailand, at TTTI Madras and KMIT, respectively, have undertaken considerable research and developed a wide range of instructional aids suitable for technical education. They possess a capacity to train others in this field.
- India, at TTTI Bhopal and TTTI Chandighar, has undertaken research on occupational analysis techniques, in part based on the DACUM methodology but adapted appropriately to curriculum development in the field of technician education in the region. In a somewhat related field Singapore has developed some extremely sophisticated methodologies for manpower planning as well as reliable systems for feeding the resulting information into their technical education system.
- Pakistan, Sri Lanka and Malaysia have all embarked recently on

a large, specialized, institution-based system of technical teacher education. India and to some degree Indonesia, through their technical teacher training and upgrading institutions, have been down that road already, and have valuable experiences and lessons to share.

- The Philippines is developing a somewhat different approach by establishing a system of small regional continuing staff development centers for the same purpose. They have experiences to share with others interested in that course of action.

Finally, we need to address the issue of appropriate organizational structures which might be established to facilitate the information exchange which is an integral part of cooperation between member countries. For a long time, there have been calls for the establishment of an information clearinghouse. But the real issue is whether a regional clearinghouse can be at all effective without a national clearinghouse in each of the member countries. For a regional network to have any future, each must identify and adequately fund an institute which has the willingness and capacity to perform the role of a national clearinghouse.

Once the institute is identified in each of the participating countries, there needs to be a regional workshop to establish a logical, systematic and above all uniform format for the collection and cataloging of all documentation on the whole range of research papers, evaluations, curriculum initiatives, etc. which are being undertaken in each of the participating countries. All participating countries need to meet at this stage, for the uniformity of inputs – according to the ERIC format, for instance – must be established as a critical priority. Also, there has to be an agreement on the common method of information storage, print, microfiche or computer, as well as on the refereeing procedure to ensure a certain standard or quality among entries to the system. These are all critical preliminary decisions. Once these decisions are made and operationalized, the countries can realistically start addressing the problem of a regional clearinghouse. An invaluable initial activity of the clearinghouse might well be to commission the compilation of a set of case studies providing detailed examples of both successful and unsuccessful attempts at regional cooperation in technical education and technical teacher education among developing countries.

National Resource Center

Jose D. Lacson

It is now well recognized that lifelong training is necessary, both to upgrade workers' skills and to enhance their satisfaction. In the same manner, trainers have to be continually updated with the latest technological developments in their respective field of specialization. Facilities which currently cater to them include, among others, a centralized national institute to train trainers and a national resource center. The former has the responsibility for research and development in the field of curriculum development, professionalization of trainers and coordination of trainer training activities. On the other hand, the National Resource Center provides an environment where trainers can continually develop their training skills. It is important in view of the limited number of training programs available to trainers compared to the vast information they need to acquire.

A number of assumptions lie behind the idea of such a Center:

- the continuous development of trainers is vital to the improvement of training;
- trainer training programs are insufficient considering the rapid developments in the field;
- trainer training to be cost-effective must be dynamic, evolving and innovative;
- a continuous flow of information is important for trainers to be able to keep track of technical innovations;
- it is important for trainers also to be able to keep track of training innovations, national and international; and
- library services and applied research in the field of trainers training is advantageous to the development of trainers.

Functions

A Center provides:

- adequate facilities and materials for trainers to produce and try out training software and training aids;
- documentation and information control of training materials and training aids at national, regional and international levels;
- training information and materials relevant to the needs of practitioners;
- an information network at the national, regional and international levels; and
- consulting services in the application of new training techniques and training software development.

The Center provides services to program administrators, trainer training institutions, curriculum developers, research workers, trainers, and national, regional and international institutions.

Program administrators, whose main concern is to plan and evaluate programs within the goals set by policymakers, need information on cost-effective schemes as well as on the experiences of local and foreign institutions. They also need reports and recommendations of workshops and conferences which provide vital information on planning and evaluating trainer training programs.

Trainer training institutions, curriculum developers and individual research workers require vast amounts of information and documentation from both local and international sources.

Trainers, the main clientele of the Center, benefit from the opportunity to practice the production and application of training techniques and software, with the guidance of advisors.

Information requirements of trainers include teaching methods and pedagogical techniques, instructional materials, technological developments in their field of specialization and more general work on policies, administration and code of discipline.

Lastly, international and regional institutions benefit from the Center, as it forms a part of the network for exchange of information.

Information Section

The Information Section of the Center can be differentiated from other documentation and information centers in terms of learning modes and facilities. Different learning styles and learning areas will influence and reflect the type of learning facilities provided. Broadly, the data base of the Section can be classified into printed and audiovisual materials.

Printed materials that have to be acquired include books, pamphlets, periodicals, documents, research findings and reports on trainer training and related fields, workshops and conference materials, curriculum and learning materials, case studies and learning exercises. More general materials on library science, documentation techniques and psychology may be included. Audiovisual materials on the field of trainer training can utilize record players, tape recorders, projectors, videotape equipment and computer facilities. Local and foreign sources can be tapped depending on the specific needs of the clientele.

Before establishing the section, the information needs should be surveyed to identify priorities. A network with institutions concerned with trainer training and vocational training can provide access to information and materials in the areas.

The main functions of the section would include collection, processing, dissemination of documents and instruction on the use of available facilities.

The acquisition and maintenance of a database can be achieved through purchase, solicitation and exchange. Purchase is a simple operation constrained by the financial resources of the Center. Solicitation from other institutions and agencies provides a less costly alternative. Exchange of materials is feasible only when the section has a substantial collection of its own.

Printed documents can be maintained either in their original form or on microfilm/microfiche.

Documentation involves cataloging and classification of printed and audiovisual materials. Since training packages consist of both types of materials, the assembly of related but separately stored materials can be facilitated by efficient indexing and cross references. For effective control, the use of an authorized list of index terms (thesaurus) is advocated. The thesaurus facilitates classification as well as retrieval of documents.

The use of printed and audiovisual materials demands adequate, appropriate space. This may include sound insulated booths wired for projectors and recorders.

Dissemination to actual users entails the preparation of mailing lists of training centers and trainers. Brochures and leaflets describing the services of the Center can be sent to possible clients as a first step toward marketing its services. Publications such as newsletters, bulletins and journals can be distributed as a part of its services.

Lastly, instruction in the use of available facilities will require trained personnel with the combined skills of a librarian, an educationist and a counselor. An intrinsic understanding of the purpose of the Center is essential.

Production of Learning Materials

Although the Center itself does not conduct research and development activities, the Center provides facilities, equipment and advisory services that would allow a trainer to produce learning and audiovisual materials.

A paper prepared by the International Center for Advanced Technical and Vocational Training in Turin, Italy discusses the physical provision of a Learning Resource Center: "The physical provision of a learning place in which a Resource Center plays its part will include the usual classrooms, seminar rooms, tutorial rooms and so on, but these will be designed to permit the fullest exploitation of the learning media and assistance which the Center provides. Seminar rooms, for example, might well be designed with a fifth sloping wall to act as an overhead projector screen; they will have ample electric socket outlets and possibly a video link with the television studio and possibly a mobile television van, a media store, a media and reprographic preparation area and a maintenance section."

Provision for computer facilities has to be made, particularly in countries planning to use computer-assisted learning and computer-assisted design technology.

The degree of sophistication of the Center will differ from one country to another depending on the services it wishes to offer, the current or projected level of technology applied in training, and resources available in the country or from aid-giving countries or even from networking centers.

The provision of facilities for trainers' practice in production of training software necessitates the maintenance and updating of equipment in line with the level of technology applied in training institutions and industries. The relevance of the Center hinges on this, since it should complement the trainers' activities in the actual workplace.

The availability of suitable support staff to maintain the available facilities is of utmost concern. Likewise, the manager of the Center should be well versed in current practices in vocational training in general and trainer training in particular.

Provision of Consulting Services

The provision of advisory services is on two levels, namely, the selection of learning modes and facilities appropriate to learning activities, and the production of training software. The two require specialists with different areas of expertise.

On the first level, specialists need to be educationists with training in library science. The second level requires knowledge of curriculum development, preparation of audiovisual materials, selection of media for training purposes, preparation of exercises, case studies, test materials and application of training techniques and methods. Work experience as trainer is required; familiarity with training situations and problems would enhance the coaching and advisory process. The staff would need continuous updating on current practices and developments, for the strength of the Center would depend on the staff as much as on the facilities.

Institutional Framework

A country planning to establish a Center can start it as a separate entity or attach it to an existing institution. The choice will be determined by the human and material resources, and the availability and capability of institutions.

Several options are still open to any country. For instance, the Center can be established as a foundation whose membership will be composed of trainers and training institutions. The governing body will comprise their representatives. The organization shall be self-sustaining and income-generating, though the revenues generated will be kept at a minimum. The Center can also be established as a government agency for the development of trainers. Funds can come from foreign aid or from the government budget, and a national committee can be responsible for policy-making to forge a strong coordination between the Center and its end-users.

A quite different option is to attach the Center to an existing trainer training institution, vocational education institution or vocational research institution. As an attached agency, its material and human resources shall come from the mother agency. The framework of the institution in which the Center will have to operate has to be determined in advance by weighing the merits and demerits of each of the alternatives.

Whatever alternative the country adopts, it has the additional option to establish Regional Resource Centers. Regional Centers provide the same services as the National Center, though on a smaller scale. This approach enhances the accessibility of the Center to its end-users. Criteria that can be used in choosing an appropriate location are accessibility and concentration of training institutions.

Management

The Center should be entitled to a separate budget and should have its own work plan and development plan. It is better not to undertake its creation until sufficient funds, space or trained personnel are available for its development. If the Center is a government-attached institution, it is essential that the financing of the Center is included as a fixed item in the national budget, and the financial commitments entered into are on a long-term basis. As regards the allocation of resources, UNESCO suggests that about two-thirds of the expenditure should be devoted to staff and one-third to material resources.

The step-by-step development of the Center will be greatly facilitated by the establishment of a work plan, prepared for each budgetary year. The work plan should not be a detailed document; it is conceived rather in the form of a checklist of activities, established in priority order, and structured according to the set objectives of the Center. The work plan should contain the necessary data for each activity, grouped in order of priority under the main functions (e.g. documentation of training materials, provision of services in training design, etc.). Each entry will contain a short description of the activity, the name of the staff member responsible for carrying it out, the deadline set for the completion of the activity, and the estimated cost, when necessary. The work plan should permit periodic control and evaluation of the work completed and of the rate of implementation of the progress throughout the budgetary year.

In order to implement its program, the Center needs adequately trained personnel. The size of the staff and the qualifications required depend on the size of its operation as well as the services it will be rendering. The human resources envisioned to operate the Center must have been organized and established before actual operations begin.

In order to carry out its tasks, it is essential for the Center to have adequate premises. A clear allocation of the space available should be made in accordance with a functional plan.

The Center needs to be equipped with all the equipment necessary to provide adequate and relevant services. A detailed and comprehensive study of equipment and facilities has to be done during the developmental stage of the project. Budgetary allocation for purchase of new equipment and facilities and their maintenance has to be provided annually.

International and Regional Cooperation

Parallel to its development on the national scene, the Center will also have to participate in the international and regional programs designed to promote the flow of information between countries. It will have to form a part of the international network and thus benefit from the experiences of other developing countries who had to face comparable problems. Different experiences gained by the Centers may be shared among these cooperating countries.

Evaluation

A process and an impact evaluation can be utilized to assess the performance of the Center. Process evaluation is an internal management tool designed as a control device to identify and correct deviations by comparing actual inputs and service delivery to conform with established standards. This necessitates the identification of standards in terms of quality and quantity with respect to the collection of materials, the equipment and facilities for the workroom, and qualifications of the specialists providing advisory services in the Center. Through constant monitoring the director of the Center would be able to determine easily whether the information holdings of the library are relevant to the needs of the Center's clientele, whether the equipment facilities available are at par with those used in the actual workplace, whether the specialists and staff of the center would require additional training and whether the functional use of the Center facilities are maximized.

Impact evaluation provides information to policymakers on the achievement of the Center's goals and the conditions under which achievement is greatest or least. Generally, impact evaluation is conducted after a preset gestation period of three or four years. It would serve as a justification for the continuous existence of the Center, its termination or modification. Some suggested parameters for evaluation are:

- percentage of target clientele reached and serviced;
- relevance of service rendered to the development of trainers; and
- adequacy of services rendered to trainers and training institutions.

Although education and training are just two of the various factors that influence economic growth, it can be said that a strong vocational technical education system is a major contributory factor to the development of countries like Japan and Germany. In recognition of the significant role played by trainers in the training process, their development should be carefully safeguarded.

Monitoring and Evaluation in Technical Teacher Training

Robert R. Buck and Donald K. Mitchell

Let us begin with what we call a developed country model for technical and vocational teacher training.

Approaches to the training of technical/vocational teachers in Australia vary somewhat from state to state, but there is general consensus that a prospective technical/vocational teacher should exhibit the following characteristics:

- pre-teacher-training qualifications
- pre-teacher-training work experience
- aptitude for a teaching career
- maturity

and that, on the basis of such characteristics, teacher training programs should then focus on the development of pedagogical skills, the application of trade and technical skills to the needs of the curriculum, and the fostering of appropriate attitudes towards the profession of teaching. In essence, technical/vocational teacher training in Australia takes a competent, trained and mature tradesperson or technician, and through a course of teacher training aims to develop that person into an effective teacher.

THE TECHNICAL TEACHER

An Ideal Model

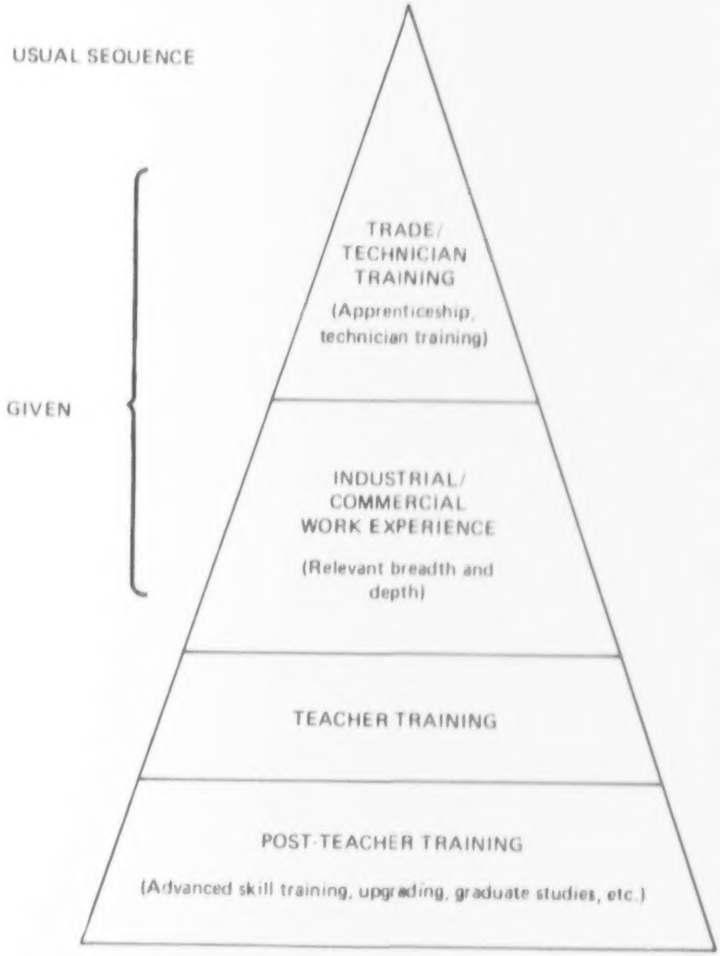
The Victorian view of the *ideal* technical teacher, a view which is substantially the same throughout the country, is based on the existence of a number of complementary attributes (Figure 1):

- formal trade/technician training – through apprenticeship and/or technical college studies and work experience leading to official and legal certification as a qualified tradesperson or technician;
- extensive work experience, in industry or commerce, which is based on and extends the studies undertaken;
- a course of teacher training, conducted by an approved institution; and
- post-teacher-training, ongoing upgrading of trade/technician competence and knowledge, and pedagogical skills and understanding.

Thus, in the Victorian situation, the typical technical teacher in the trade area will have:

Figure1

THE IDEAL TECHNICAL TEACHER
(Developed Country Model)


USUAL SEQUENCE
GIVEN
TRADE/ TECHNICIAN TRAINING
(Apprenticeship, technician training)
INDUSTRIAL/ COMMERCIAL WORK EXPERIENCE
(Relevant breadth and depth)
TEACHER TRAINING
POST-TEACHER TRAINING
(Advanced skill training, upgrading, graduate studies, etc.)

- completed a three or four-year apprenticeship, including both formal studies and indentured work experience, leading to certification with the Industrial Training Commission in the particular trade;
- spent at least four years, and preferably more, in the industry for which he/she has been trained; and
- undertaken a course of teacher training at a recognized training institution, again leading to formal certification.

On the basis of these, the teacher is then ready and eligible to take up full-time duties in the technical schools and colleges, as a qualified technical teacher, meeting the prescribed requirements established by the Ministry of Education, through its employing authorities and boards.

Trade/Technician Training – Evaluation of Trade Skills

The identification of acceptable standards of technical skill and knowledge occurs outside the teacher training process, in that trade skills and knowledge are attested to by formal processes with which the teacher trainers do not need to concern themselves.

The initial certification of the tradesperson as competent is provided in Victoria by the Industrial Training Commission, the body which is charged with a number of duties under Government regulations, including keeping under review:

- the requirements of the State for skilled tradesmen and technicians;
- the availability of skilled tradesmen and technicians to meet those requirements;
- the availability of young persons for training in skilled trades or as technicians;
- the availability of vacancies for apprentices, pre-apprenticeship trainees, adult trainees, prevocational trainees, and trainee technicians and the extent to which employers are participating in the training of such apprentices, trainees and trainee technicians;
- the adequacy of the training of apprentices, pre-apprenticeship trainees, prevocational trainees, and trainee technicians in employers' workshops, technical schools, or elsewhere, and measures which can be taken to improve that training;
- the adequacy of the apprenticeship system as a means of training skilled tradesmen and the desirability of modifying that system

or of providing other systems of training for skilled occupations; and

- with respect to any further training or retraining which skilled tradesmen or technicians may undertake after completion of an apprenticeship or a course of training as a technician, the adequacy of such further training or retraining in employers' workshops, technical schools, or elsewhere, and measures which can be taken to improve that training.

The Commission, therefore, plays a vital legal role in providing benchmarks on the basis of which industry can be confident that trade trainees have reached an adequate standard of preparation to enter their trade areas as qualified tradespeople.

More specifically, it satisfies the teacher trainers that a prospective technical teacher has reached an acceptable level of competence in the trade or technician area for which the person is being considered as a potential teacher-trainee.

Evaluation of Industrial Work Experience

In the area of relevant work or industrial experience, too, the teacher trainers will generally look elsewhere, to employers and the prospective trainee's employment history, for indicators of the suitability of the practical experience the applicant has had in his or her trade/technician field. No formal certification is expected or provided in this area, although the breadth and depth of an applicant's experience will be influential in determining eligibility for entry to teacher training. Thus, the carpenter who has spent, since basic training, four or five years making nothing but doors for kitchen cupboards would be held to have inadequate work experience, lacking in both breadth and depth: that carpenter would not be considered appropriately *experienced* for admission to training as a technical teacher.

TRAINING THE TECHNICAL TEACHER

The following training model is based on the program developed and conducted by a major college of advanced education in Victoria, the Hawthorn Institute of Education, and is a program which has been accorded official recognition by the Government. Indeed, such is the weight of that recognition that trade and technician teachers from Victoria's technical and vocational schools are expected to train at that

Institute in order to gain registration and employment by the relevant employing authority within the Ministry of Education.

A Model of Technical Teacher Training

The Diploma of Technical Teaching is a course of technical teacher training which provides essentially for candidates who are admitted to training for the teaching profession on the basis of their specialist trade or technical qualifications, supplemented by extensive industrial experience.

By and large, these candidates are mature, practical, capable people with a desire to get on with their chosen task of teaching, and, in common with other mature-age entrants to advanced education, they possess a sense of commitment which makes them purposeful in their studies.

The Diploma comprises:

- A two-year Core Component consisting mainly of professional studies; and
- A one-year Complementary Component consisting entirely or predominantly of specialist studies.

The Core Component is undertaken by all candidates through a series of studies in a variety of modes over two years at the Institute or undertaken by a phased program provided at times and locations which are negotiated with client groups. The course can also be studied in part-time mode over three years. On the successful completion of the core, candidates receive the Certificate of Technical Teaching.

The Complementary Component, which constitutes the third year of the course, may have been wholly or partly completed before commencing the Core Component, but is more usually undertaken or completed at the conclusion of the Core Component. This flexible arrangement is designed to cater for the diverse backgrounds of nongraduate entrants into teaching. It is intended that those entrants who lack the Complementary Component requirements will normally complete those requirements by part-time study following the Core Component. It is also intended that those requirements will ensure that course graduates will have acquired expert knowledge and skills in their specialized field to a level substantially beyond that at which they will be required to teach. The requirements also accommodate studies which will contribute to the further development of candidates as educators and as educated persons.

Principles Underlying the Course

Four guiding principles or models underpin the Diploma course:

- internship model;
- teaching experience as the central focus of the course;
- developmental model of professional growth; and
- adult learning model.

Internship Model

Internship, whereby trainees are attached to schools and colleges as members of the staff for a number of days each week for the duration of the Core Component, has proved to be the most appropriate and efficient preparation for teaching in technical schools and colleges for a number of reasons:

- Trainees enrolled in the Diploma of Technical Teaching expect to teach and want to teach. As adults having chosen a new vocation they will not readily tolerate a lengthy period of theoretical grounding and artificial teaching situations before being allowed to take up the actual task. Their need for practical experience is associated with their concept of themselves as independent, capable people.
- By giving trainees early access to actual teaching with real responsibility for the arrangement and learning of students, their genuine teaching concerns are aroused. The resolution of their problems then becomes the focus of the courses. In this way the perennial problem of the gulf between theory and practice in teacher education can be bridged.
- The internship system is preferred by the employers, as trainees quickly become integrated into the social and professional life of schools and colleges, able to accept the responsibilities of functioning staff members.
- The internship system provides trainees with a salary while they are obtaining a teaching qualification. If they were not employed as temporary teachers, few skilled tradesmen and technicians could be expected to change their career in midstream.

Teaching Experience as the Central Focus of the Course

The central role of teaching experience in the training program is reflected in the following:

- The intern system is the key to the whole initial training program, in that the studies should be determined by what is needed to illuminate and improve trainees' professional performance.
- The concerns,of trainees change and develop, albeit at different rates, through an identifiable set of stages during the course: with self, with self as teacher, then with students' learning. Both the studies and the teaching experience program must stay in step with the emerging concerns of students.
- Knowledge is acquired by active engagement with real-life problems, not in context-free settings divorced from genuine needs. All knowledge is ultimately personal: it is gained when individual learners make their own links between the new information and their existing explanatory system. The raw data for this learning process are acquired in classrooms and workshops.

Developmental Model of Professional Growth

The present view of the changing needs of trainees is supported by an extensive body of studies of trainee teachers' stages of growth by Frances Fuller and her colleagues at the University of Texas. Fuller's empirically based model describes three stages of teacher development, distinguished by the type of teacher concerns dominant at a particular time.

- Stage 1 concerns self and personal adequacy in coping with the new role as teacher;
- Stage 2 concerns the task of teaching and mastering the organizational and interpersonal demands of the classroom and workshop; and
- Stage 3 concerns the impact of one's teaching on student learning.

There are important implications for teacher education in this model. Trainees learn best what they want to learn, and have great difficulty in learning material which does not interest them. Fuller claims that education programs are too often out of step with the dominant concerns of the trainees, that teacher educators "may be answering quite well questions students are not asking" (Fuller, 1969). If courses are to avoid the frequent attack of irrelevance (Lortie, 1975) they should be structured so that they address questions that trainees are asking at their present level of development.

The Diploma of Technical Teaching program seeks to match such a developmental model. The emphasis in Year 1 on Principles and

Methods of Teaching, Syllabus Studies and Communication Studies reflects the beginners' need to achieve credibility and competence in their new career. The triad relationship between trainee, class supervisor and supervisor in the field is designed to provide close support during the initial Learning-to-Teach phase of the teaching experience program.

In Year 2, after trainees have demonstrated that they can perform adequately in their schools and colleges, they are ready to see the relevance of broader educational studies: Curriculum Design, Assessment of Student Learning and related issues in Educational Psychology, Principles of Sociology. Freed from the demands of close supervision in Phase 2 of the practicum, trainees then undertake a program of field research projects under the guidance of subject specialists, with the field supervisor as consultant. These inquiry-oriented studies, tailored to the developing needs of the individual, are designed to build the links between education theory and trainees' real-life experience.

Adult Learning Model

Trainees enter the course as mature adults at an average age of 30 and with approximately 13 years of work experience in industry or commerce. They have acquired a high level of practical skill and a thorough understanding of their practical field. They tend to have a strong sense of commitment to their new careers; in this they resemble other mature-age entrants in advanced education.

The Institute finds that trainees have the maturity and experience to accept a degree of responsibility for identifying their needs and of deciding how these might be best answered, and that there can be collaboration and consultation between staff and trainees in planning study programs.

The aim of the course is to prepare independent, self-directing teachers, able to reflect on and analyze their professional performance; matching this is the principle that the course itself, in its design and teaching methods, should exemplify the same processes (Figure 2).

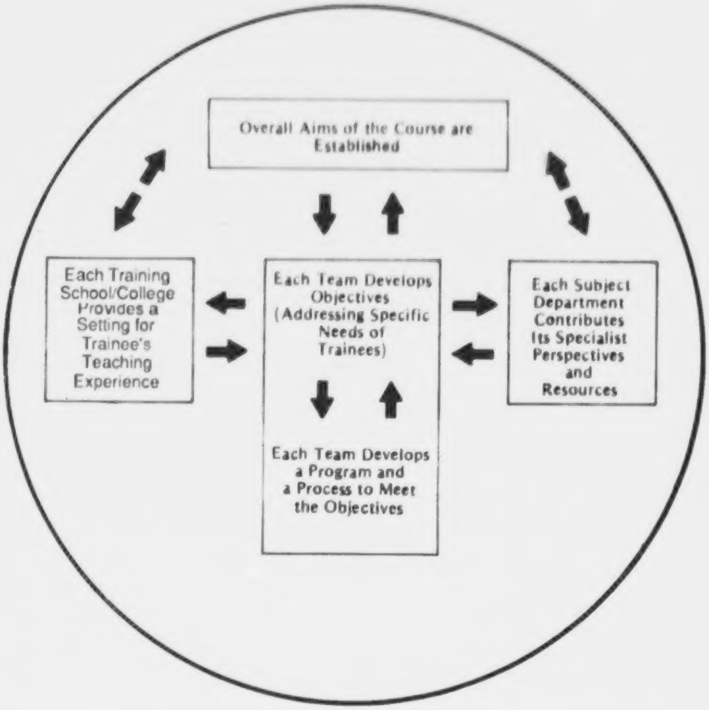
Course Aims

The overall aim of the course is to meet the developmental needs of trainee-teachers in respect of their capacities to:

- demonstrate the essential knowledge, skills and attitudes to enable them to design and implement effective learning experiences for their students;

Figure 2

MODEL FOR COURSE DESIGN AND DELIVERY


Overall Aims of the Course are Established
Each Training School/College Provides a Setting for Trainee's Teaching Experience
Each Team Develops Objectives (Addressing Specific Needs of Trainees)
Each Subject Department Contributes Its Specialist Perspectives and Resources
Each Team Develops a Program and a Process to Meet the Objectives

- fulfill a professional role as members of an educational organization;
- maintain a program of self-development which will extend competence in educational, specialist and personal areas relevant to their roles as teachers.

The fulfillment of this general aim will require that on completion of the course for the Diploma of Technical Teaching, each trainee will be able to demonstrate an ability to:

- plan, prepare and implement effective learning experience for both adult and adolescent learners;
- manage the learning environment, including the use of a variety of methods, materials and resources to promote effective students' learning in a safe and appropriate setting;
- evaluate student learning and the effectiveness of the learning program;
- develop the relevant areas of the curriculum in relation to the overall aims of their school, college or training organization;
- advise students concerning learning progress, personal and career matters and identify appropriate referral resources;
- develop and maintain professional relationships with colleagues, including teaching, administrative and support staff; and
- maintain a personal development program which extends teaching competence, enhances technical competence and develops personal, social and professional skills.

Evaluation and Monitoring of Progress

Once a trainee has entered a teacher-training course, responsibility for the monitoring and evaluation of his progress as a student-teacher rests entirely with the institution within which that training takes place.

The heavy emphasis on the role of teaching experience within the intern model has given rise to an approach to ongoing monitoring and evaluation of pedagogical growth which we term "clinical supervision".

It is to this central element of the evaluation processes used in the training of technical teachers that we now turn. Essentially, we are addressing how we assess the trainee as the training progresses, in the real-world context of the classroom. (On-campus foundation studies in areas such as Methodology, Curriculum and Psychology are, of course, assessed through more traditional means – assignments, progress testing, and formal examinations – generally under the control of subject lecturers.)

The Supervision Cycle

Within the Diploma course, the teaching experience program falls into two parts:

- Phase 1 – when, early in the course, trainees need close supervision and a clear statement of the teaching skills they need to develop (the Learning-to-Teach Agreement); and
- Phase 2 – when more advanced teaching strategies and activities are encouraged in the wider school/college community.

The three aspects of the cycle are shown in Figure 3.

Pre-Session Conference

Here the trainee and supervisor meet for a pre-session conference to plan the lesson or to review the trainee's plans. Each conference is preset and lasts, on average, 10-15 minutes. It is at this conference that the supervisor's experience is most valuable to the trainee – before mistakes are made rather than after.

In the pre-session conference, the supervisors limit their observations to the most urgent problems, as identified by the trainee. This ensures that the feedback is specific and relevant, rather than general and global. Beginner-teachers cannot easily act on the supervisor's advice when it covers every fault observed.

Observation

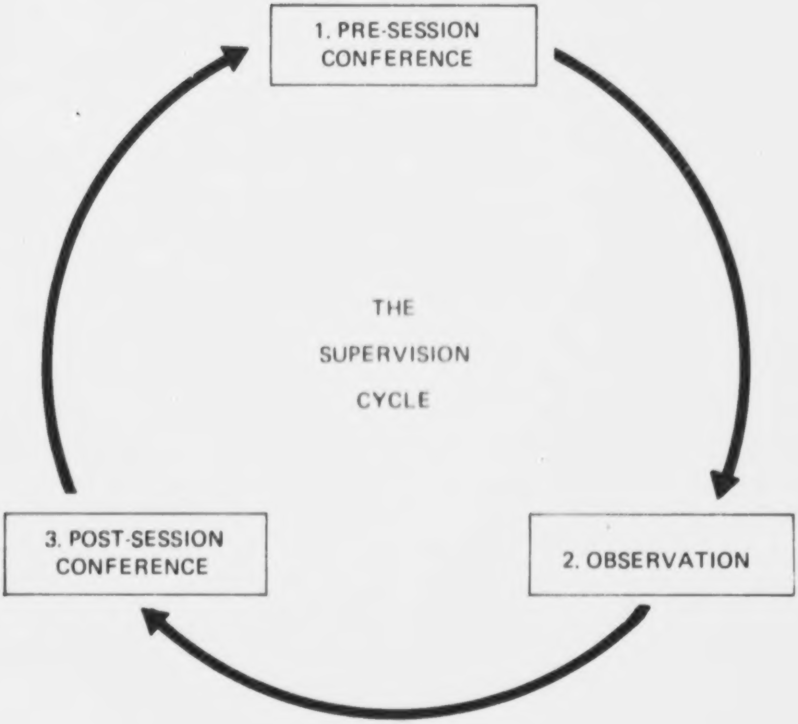
The trainee teaches the session, with the supervisor observing, concentrating mainly on agreed issues and making notes on the record sheet. Supervisors look for "hard" data whenever possible, making diagrams, taking tallies, writing transcripts of what trainees and students actually say. By confronting trainees with this sort of evidence, there is good chance they will change their own behavior.

Post-Session Conference

Here the session is reviewed, with the supervisor asking the trainee for his or her reactions to the session. If trainees are encouraged to assess their own teaching they will tend to heed the advice more than if the supervisor takes over the responsibility for both pointing out their faults and suggesting changes. More often, this discussion will reveal a gap between their perceptions of the session and the supervisor's. This is

Figure 3

THE SUPERVISION CYCLE (Stage 1)


1. PRE-SESSION CONFERENCE
THE SUPERVISION CYCLE
2. OBSERVATION
3. POST-SESSION CONFERENCE

when objective data is required as evidence to support the opinions of the supervisors.

This post-session conference must have outcomes; that is, it must produce decisions about what will be tried, altered, avoided in the next teaching session. The aim of the supervision is to change trainees' behavior, not simply to pick faults.

The Learning-to-Teach Agreement

An integral and vital element of the supervision cycle is the Learning-to-Teach Agreement which is developed by the 'triad' – the trainee, his/her school supervisor, and the Institute. The agreement is prepared in Phase 1 of the cycle, listing the basic skills needed by each trainee to survive in his/her particular teaching situation. The agreement is signed off by the triad as soon as basic competence has been achieved.

What to Include in the Learning-to-Teach Agreement

The agreement is limited to the *basic initial skills required by a beginner* in his or her specific teaching context and might include:

- the effective planning of single lessons or short-term projects;
- reasonable class control and signs of the ability to relate well with students;
- the ability to organize the "traffic" in a classroom – group of students, materials and aids; and
- a working knowledge of the school/college administrative routines on roll marking, assessment, maintenance and storage of equipment and materials, etc.

The aim of each triad is to move the trainees through the 'survival' phase as quickly as possible so that they may devote their energies to higher level Phase 2 concerns with such issues as quality of student learning, curriculum and alternative teaching strategies.

Reviewing the Learning-to-Teach Agreement

Review meetings of the triad are held from time to time to discuss the trainees' progress and to make any minor adjustments to the agreement that the group deems necessary.

When has a skill been "adequately demonstrated"? This is a matter for the professional judgment of the triad. It does not mean the trainees have demonstrated the competency once, or that they do it every time.

It means that trainees are aware of the need to master a particular technique or strategy and that they are beginning to incorporate it into their routine teaching style.

Signing Off the Learning-to-Teach Agreement and Setting Up Phase 2

Any member of the triad may call the meeting to sign off the Learning-to-Teach Agreement. This meeting should not be delayed any longer than necessary. Trainees are being deprived of the more advanced activities of Phase 2 if they are held to the basic agreement for too long.

All triad members sign the agreement. The Field Coordinator endorses that the triad members have collaborated properly and have drawn up a professionally adequate agreement.

Phase 2 of the Program

Phase 2 presumes that trainees have progressed beyond basic competence to a new stage of professional development. As they become more secure they shift from self-concerns to concerns with students' learning. In Phase 2 they are expected to become involved in activities which will improve the learning in their classrooms and workshops, and which will also take them into the wider school/college community.

Writing the Phase 2 Agreement

The agreement will include two types of activity: those centered on teaching in the classroom and workshop where the trainee tries new methods or activities to improve the quality of students' learning; and those which require the trainee to participate in activities in the wider school context or beyond the school.

Assessing the Phase 2 Agreement

At the final triad meeting, the members assess Phase 2, giving a result of P (Pass) or N (Fail) by applying the following criteria:

- Has the trainee shown a willingness to become involved in the Phase 2 activities? "Shown willingness" is assessed on the basis of whether the trainee has

  - contributed ideas of his/her own in planning the activities;
  - taken responsibility for searching out information or conducting investigations relevant to the projects; and
  - initiated discussion on the projects with the supervisors.

- Has the trainee learned from the Phase 2 activities? "Learning" is assessed by
  - the trainee presenting the accumulated records of work done to the supervisors; and
  - the trainee's ability to discuss implications and draw conclusions from the activities.

Assessment of the Subject "Teaching Experience"

At the end of the course, the trainee-teacher receives a result of P (Pass) or N (Fail) in Teaching Experience. To achieve a P (Pass) requires that:

- the trainee teacher adequately demonstrates performance of the competencies in the Learning-to-Teach Agreement;
- the trainee has carried out the Phase 2 agreement to the satisfaction of the triad; and
- the trainee-teacher has been in an approved teaching practice situation for the duration of the course.

Detailed attention has been given to the idea of "clinical supervision" and the overall supervision model to underline both the centrality of teaching practice in the training program, and the importance of the supervision of that practice in the evaluation and monitoring of the trainee's progress through the course of teacher training.

THE TRAINING MODEL – CERTIFICATION

The model program to which we have referred above provides certification for successful candidates at *two* levels – after the completion of the first two years of the program, the Certificate of Technical Teaching is awarded and, on the completion of the full three years, the Diploma of Technical Teaching is issued.

At either level, the successful trainee satisfies official requirements for the purposes of employment, and also registering board requirements for the purposes of general registration. In sum, the "graduate" has received a formal license to teach. However, to reach "fully qualified" status, candidates must complete the Diploma, or undertake studies to an equivalent level which are recognized by the Ministry as an acceptable alternative.

Thus, although the full-time attendance at the Institute is completed after the Core Component, i.e., after two years, the ongoing maintenance of the new teachers commences immediately as they move into additional studies for the completion of the Diploma of Technical Teaching course in their own time, while fully involved in their teaching activities.

TEACHER MAINTENANCE

Without proper recognition being given to the concept of teacher maintenance through a regular program of in-service activities, the graduating teacher may remain during his/her career at much the same level of technical skill and teaching awareness as that which obtained on the completion of initial training. To ensure proper professional growth throughout the teacher's career, attention must be given to –

- trade/technical skills upgrading;
- teaching skills upgrading;
- industry/commerce awareness; and
- professional development.

These are handled generally in the following ways:

Trade/Technical Skills Upgrading

Recognizing that technological advances need to be constantly introduced into the curriculum, teachers are required to undertake upgrading courses which familiarize them with the latest techniques, materials and equipment.

Without such upgrading through carefully developed in-service training programs, the teacher becomes irrelevant to the task of passing on up-to-date skills to the students in the schools, and, more importantly, the schools fail to satisfy community and national expectations in respect of their teaching capabilities.

Teaching Skills Upgrading

Again, in-service programs ensure that new curriculum developments and teaching techniques to handle such developments are passed on to the teachers on a regular basis, normally through the teacher training institutions.

Industry Awareness

A fundamental principle which underpins the notion of the ideal technical teacher is not only extensive industrial experience, but, more especially, the maintenance of that experience on an ongoing basis, for without that regular involvement with the industry within which the teacher has originally worked, awareness of current practices, techniques and organizational structures fades away. If we are to expect technical teaching to encompass both theoretical and *practical* aspects of trade/technician knowledge, the regular return of the teachers to industry and commerce is essential, to enable them to speak with confidence and accuracy on the real-world situations for which their students are being prepared.

Professional Development

The ideal teacher ceases to be ideal if ongoing professional development in all facets of his/her activity as a teacher is not practiced. Technical teachers who have trained are encouraged to return to undertake advanced studies leading to formal awards. To retain the focus on the ideal teacher, sustained professional growth throughout that teacher's career is essential.

THE APPLICATION OF THE DEVELOPED COUNTRY MODEL IN THE ASIAN REGION

Now we look at two countries in which we have formulated programs which apply, in somewhat differing ways, the developed country model. Here, greater emphasis is given to evaluation and monitoring techniques as they are applied in both the trade/technician skill areas and in pedagogical competence and awareness assessment. The concept of clinical supervision continues to be applied in broad terms, although organizational demands require some modification to be made to the processes.

REACHING THE IDEAL THROUGH INITIAL TEACHER TRAINING – MALAYSIAN EXPERIENCE

The Malaysian example which follows provides a reasonably close parallel to the Australian model in sequence of development of the teacher, but it shows how a shift in emphasis in the teacher training component aims to overcome some shortfall in the basic skills development and subsequent work experience areas.

Training the MARA Teachers

Since 1984, a program of basic or initial teacher training has been conducted by the Hawthorn Institute of Education for teachers in Malaysia's IKMs, technical colleges established to "motivate, guide, train and assist" the indigenous people of Malaysia to participate actively and progressively in commercial and industrial activities. Some 36 technical and vocational trades are taught in these IKMs, normally through a two-year program which combines theory and practice. On the successful completion of the trade course, the qualified "graduates" seek to enter technical or vocational employment in Malaysian industry.

The following program has been developed for the instructors in these MARA technical colleges, through a joint Australian/Malaysian course structure, supported by a vigorous fellowship program.

The Program

The program, prepared after close consultation with the relevant Malaysian authorities, is structured in two stages, and is designed to build up skills in teaching and subject specializations, and curriculum development.

STAGE 1 Conducted in Malaysia and in Australia (at Hawthorn Institute of Education), comprising:

- core components;
- vocational skills upgrading; and
- teaching experience.

The duration of this stage is 1440 hours.

Upon the successful completion of Stage 1, a Certificate of Vocational Teaching is awarded.

STAGE 2 Comprising:

- a teaching experience program to be conducted in Malaysia, minimum 330 hours; and
- complementary components to be conducted at Hawthorn Institute of Education or in Malaysia by Hawthorn Institute of Education appointed staff, duration 280 hours.

Upon the successful completion of Stage 2, the Diploma of Technical Teaching would be awarded.

To date, the major focus has been on the completion of Stage 1, and some 85 instructors have completed the certificate of Vocational Teaching Program, which has emphasized:

- improvement of trade/technical skills by attendance for two days each week at Victoria senior technical (TAFE) colleges; and
- industrial attachments which have supplemented and extended trainees' understanding of current practices and facilities.

Essentially, heavy emphasis has been placed on a program which further develops in the participants both theoretical knowledge and hands-on practical application of that knowledge in their trade fields.

Similarities to the Australian Model

- MARA instructors are recruited *after* completion of a formal trade course – usually taken in an IKM;
- MARA instructors are recruited *after* the completion of a period of work experience in industry or commerce in Malaysia; and
- Now, with the training program established, MARA teacher preparation follows in sequence to the two steps noted above.

Dissimilarities to the Australian Model

MARA trade training is shorter in duration, two years compared to four years in, say, Victoria, and industrial experience has tended to be more limited in duration, breadth and depth.

Competence Evaluation

Because of the emphasis placed, inter alia, on the improvement of basic trade skills, a key element in course preparation has been the identification and evaluation of the competence levels of prospective trainees.

This is achieved through:

- in-Malaysia individual assessment of such levels by Hawthorn staff members, in collaboration with the trainee and representatives of the trainee's employing authority; and
- the development and presentation in Australia of an individualized program based on the competency needs of the trainee. (This is complemented in the course itself by studies in analyzing competencies so that the trainee teachers can themselves identify basic practical tasks and break them down into subtasks, basic skills, knowledge and attitudes, and then be able to write each of the detailed activities in behavioral objective terms.)

At the teaching level, pedagogical competencies are prescribed, and supervised during the "practicum", the teaching practice element of the course.

More specifically, the assessment of trade/technical skill levels is based on a two-level approach:

- one-to-one counterpart assessment, whereby a fully qualified and experienced Australian counterpart determines by observation and discussion the levels of competence of the prospective trainee and, on the basis of this observation, develops a tailored program of skills training and upgrading for the individual trainee; and
- application of evaluative instruments which have been developed, generally in the Australian context, to identify basic competence, and also monitor progress – frequently through a program of modules – in the various trade specializations.

The MARA Program – Overview

The application of the developed country model to the MARA group has been essentially in the area of teacher training, insofar as there are similarities with the developed model in such areas as pre-teaching trade training and pre-teaching industrial experience. Much greater emphasis has been placed within the teacher training program for this group on skills training and work experience in order to extend their levels of competence at which they would be expected to teach in their colleges.

The model of teacher training which is applied to the MARA trainees is based on the Diploma of Technical Teaching, with Stage 1 of the course closely paralleling the core component of the Diploma program. The adaptation of this course to meet the Malaysian needs has been relatively straightforward, although much heavier reliance has had to be placed on the identification of trade competence than would be typical in the Australian experience.

We need to stress the importance in our operation of counterpart involvement in the assessment of technical skills, not necessarily by the application of written/practical trade tests, but rather through the medium of experienced and skilled observation and evaluation by fully qualified counterpart staff competent to accurately assess skills levels and prescribe appropriate training.

REACHING THE IDEAL THROUGH POST-INITIAL TEACHER TRAINING – THE INDONESIAN EXPERIENCE

The path through which the ideal technical/vocational teacher is reached in Indonesia varies in practice from the developed country model in at least three respects:

- *formal* officially-certified basic trade/technical training has been more difficult to obtain after secondary schooling;
- industrial/commercial experience, *prior to entry to teacher training*, has been limited or nonexistent for many prospective trainees; and
- teacher training has, as a consequence, been called upon to provide not only pedagogical training, but also trade/ technical/ vocational specialist training and real-world work experience to a level which should ideally compensate for the training and experience which obtain in the developed country model.

Generally, the model of technical/vocational teacher development which operates in Indonesia as a result is characterized by a single teacher training course (now of three years' duration) which attempts to encompass teaching skills and understanding, *and* trade/technical skills and understanding *and*, to some extent, real-life work experience. Unlike the Australian model, the distinct elements of trade/technical training, industrial/commercial work experience, and teacher training, do not stand alone, and their individual development tends to be blurred, and become less specialized in the all-embracing approach of the Indonesian system.

Clearly, systemic needs – for substantial numbers of technical/ vocational teachers, ready for the classroom as quickly as possible – militate against the application of the developed country model in the orderly and relatively leisurely manner which has become the norm in Australia, and it has been necessary, therefore, to approach the development of the ideal model in Indonesia with the demands of the system sharply in mind.

Broadly, this is done through a program of *teacher-trainer* development which contrasts significantly with the more conventional approach which focuses on the preparation of trainee teachers.

The Program

The program which has been developed in the Indonesian context approaches the concept of the ideal technical teacher through a combination of various factors:

- In-country technical/vocational teacher trainer upgrading

  Specialist technical and vocational counterparts are appointed on both long and short-term bases to work side by side with teacher trainers, assessing and advising on skills, and teaching techniques.
- In-Australia fellowship training of teacher trainers, leading to formal certification – the Fellowship Diploma of Technical and Vocational Teacher Training

  This long-term fellowship program provides specialist training in the various technical/vocational areas, advanced pedagogical studies, and industrial and commercial attachments for the teacher trainers.
- In-country assistance with the development and presentation of initial teacher training programs for technical and vocational teachers

  Working through appointed specialist counterparts, the teacher training institutions have established three-year programs of teacher preparation which aim to develop teaching skills and knowledge, technical/vocational skills, and industrial awareness.
- In-country assistance in the development of upgrading programs for practicing technical and vocational teachers, and participation in their delivery

  Counterparts have approached such in-service upgrading programs for practicing teachers from the perspectives of increasing skills competence, and the practical application of theory at every opportunity.

In essence we have approached the concept of the ideal technical teacher less directly than in the developed country model, by concentrating on the teacher training arm rather than on the trainee teachers themselves, and by emphasizing:

- the systematic upgrading of the technical/vocational skills of teacher trainers;
- the broadening and updating of the industrial/commercial experience of the teacher trainer; and
- the "practicalizing" of teaching approaches used by technical/vocational teacher trainers.

Essential to the development of the training model, however, is still the evaluation and monitoring of the technical and vocational competencies of the teacher-trainees. In-country, this assessment is conducted by counterparts, while in Australia both pedagogical and technical skills development takes place within the context of the Fellowship Diploma program.

Competence Evaluation

In determining competency levels, the role of the counterparts appointed under the Indonesian Australian Technical Education Project (IATEP) to the technical and vocational teacher training and upgrading centers in Jakarta and Bandung is central, in that advisors or counterparts are responsible for:

- the identification and evaluation of technical/vocational competencies of the teacher trainers to whom they are attached;
- the development of appropriate skills training 'packages' which are designed to upgrade and update the skills of the teacher trainers; and
- the implementation and monitoring of these upgrading packages.

In the overall development of the ideal model, these counterparts are key determining factors in the evaluation and monitoring of competencies of the teacher trainers, as the structure of training which is set in place relies not so much on the use of standardized testing instruments as on the extensive experience and expertise of those counterparts appointed to assist their in-country colleagues to raise their teaching standards both technically and professionally.

Concomitantly, because the fellowship program is an integral element of IATEP, the opportunity exists for fellows to receive in-

Australia specialized technical training and industrial work experience. Again, the in-country counterparts play a pivotal role in advising on those particular areas in which skills upgrading is necessary and which should be included in the individualized fellowship programs.

Thus, as we have seen operating with the Malaysian trainees, one-to-one counterpart evaluation of skill levels and training needs is a central element in the area of competence evaluation coupled with close monitoring, in-country, of the programs drawn up for the teacher trainers, by their counterparts. Evaluative instruments are applied, but we have found, given the generally very basic skill levels of many of the teacher trainers, expert assessment by experienced counterparts to be a preferable evaluative technique.

WORKSHOP CONCLUSIONS AND RECOMMENDATIONS

I. Training Policy

1. Training policy is the most crucial variable, and the absence of explicit and coordinated national policies is the largest impediment to the improvement of technical and vocational education/training in the member countries.
2. It is essential for national governments to articulate clear training policies, including trainer training policies.
3. Where training policies are developed or implemented by different governmental agencies, for example by ministries of labor and education, coordination is essential.
4. For both these reasons, a common policy framework is critical. National governments may require assistance in developing such a framework.
5. It may be necessary to set up a coordinating body, such as an agency or a commission charged with overall responsibility for human resources development.
6. Training levies may be considered in some countries to strengthen the funding for human resources policies, but it may not be feasible in all countries.

II. Training Staff

7. The number and quality of training staff in several member countries, currently available to train technical teachers or trainers, is a matter of serious concern. It is anticipated that in several countries the position will deteriorate further in the coming years.
8. The staff strength in some countries is distinctly below the required level. The educational qualifications, industrial experience, and teaching competence of the staff are seriously deficient in most countries.
9. The professional status and employment conditions currently applicable to trainers are generally not attractive enough to draw the best talents to the profession or to sustain their motivation.
10. The salaries and fringe benefits of trainers need to be reviewed vis-a-vis both other government personnel and industrial personnel.
11. Objective performance standards should be the only criterion for rewards in training institutions.
12. Trainers should have adequate opportunities for upgrading their skills through training and planned industrial exposure.

13. Career paths for training staff need to be developed and periodically reviewed.
14. Regional workshops for instructor trainers are essential for exchange of experience.

III. Training Curriculum

15. The quality of training curricula in some member countries needs to be reviewed. The content of such curricula in some countries does not accord with present realities and needs updating.
16. Regular reviews are needed of trainer training curricula. Representatives of industry should be included in advisory bodies charged with the responsibility.
17. Systematic occupational analysis procedures, such as DACUM or any other suitable techniques, should be the basis of any curriculum development.
18. Regional experiences in curriculum development should be shared through visits, study tours, teacher exchanges, collaboration on training materials, and joint research.
19. The assistance of private industry should be taken through subject specialists.
20. Despite varying national needs, a common framework for curriculum planning, execution, evaluation and management may be considered by member countries.

IV. Training Materials

21. The APSDIN initiative should be broadened to enable the flow of information on training materials to reach training institutions in the member countries.
22. There is a great need for systematic sharing of training materials in the region, including both printed materials and audiovisual materials.
23. There is also a need for the systematic adaptation of appropriate training materials developed in other countries for use in the member countries.
24. Training materials developed by private industry could be an additional source of materials to be usefully adapted, provided copyright rules are not infringed.

V. Training Approaches

25. Given the varying training conditions of the countries, the use of any new training approach or technique should be carefully assessed with regard to the national needs.
26. Such use should also be preceded by an evaluation of the approach in respect of:
    - its training effectiveness;
    - its capacity for delivery (especially where large numbers are involved); and
    - its cost implications, including both development and recurrent costs.
27. To make such evaluation possible, it is important for member countries to receive the fullest information about such approaches, especially their effectiveness in developing countries.
28. Competency-Based Education (CBE) has significant potential to improve curricula, strengthen learning, and minimize costs. Its possible application should therefore be explored; if considered desirable, a pilot study could be undertaken. If found effective, its dissemination should be undertaken through selected key institutions.
29. Computer-Based Learning (CBL) has significant potential in terms of individualized instruction, simulation training, and mass application. Its possible application should therefore be explored, and if considered desirable, pilot studies undertaken.
30. Many countries feel the need for some degree of CBL literacy. However, some countries expect problems in wider usage of CBL because of cost and staff implications.
31. Some countries see the need for a regional workshop on CBL for technical teacher trainers to help them understand CBL application for technical subjects. This should be preceded by a promotional film/video program to introduce the concept of CBL to administrators.

VI. Training Standards

32. Clearer training standards for each trade/skill area need to be established in the member countries as a step toward improving the quality of technical teacher training.
33. National bodies, where they do not exist, should be established for the purpose. Where they exist, their mission should be more clearly defined.

34. A clear national policy on trade/skill standards is desirable, both for quality and for economy.
35. Countries need to create item/data banks to permit better analysis and updating of such standards.

VII. Training Research

36. Systematic national research should be undertaken by the member countries in the areas of:
    - the trainer's role and job conditions;
    - management of training institutions;
    - management of new training initiatives at the national level;
    - new training approaches such as CBE or CBL; and
    - training hardware and software.
37. Regional research may be helpful in some of these areas, to highlight the potential for sharing of experiences and learning.

VIII. Regional Cooperation

38. A process of regional cooperation and collaboration will be of considerable assistance to each of the developing member countries which have much to learn from one another in respect of:
    - developing a policy framework for training in general and technical teacher training in particular;
    - improving the status and motivation of trainers;
    - evolving objective and competency-based rather than topic-based curricula;
    - developing training materials to meet the needs of their curricula, through occasional adoption and frequent adaptation;
    - assessing new training techniques and approaches in the light of their special needs, and accepting those that are likely to produce the best results;
    - developing trade/skill standards and creating effective certification systems; and
    - formulating and executing research plans and then sharing results, both for improving training efforts and for guiding long-term policy.
39. The collaboration could take the form of:
    - formal exchange of staff and materials; and
    - informal contacts through visits and tours.

In addition, such collaboration could be in the shape of workshops where interested countries met to discuss common themes, funded preferably by international agencies.

IX. Technical Assistance

40. The member countries need technical assistance from international agencies such as APSDEP, ILO and ADB in their individual efforts to improve the quality of technical teacher training through:
    - evolving a better policy development process;
    - developing curricula;
    - sourcing and accessing better training materials;
    - exposing training staff to better institutions and better training methodology in advanced countries;
    - carrying out effective research with training problems; and
    - understanding and applying new and better techniques that have application in developing countries.
41. The member countries also need technical assistance from international agencies in their collective efforts to improve technical teacher training, through support and funding for:
    - staff visits to other countries;
    - joint research projects; and
    - collective workshops on training issues such as staff recruitment/development, curriculum renewal, new approaches and techniques, industrial participation, instructional material development, etc.

Annex 1

Workshop Participants and Observers

COUNTRY REPRESENTATIVES

Bangladesh	Md. Rafiqul Haque Principal In-Charge Technical Teachers' Training College Dhaka-1208, Bangladesh
Burma	Kyaw Hla Director (Manpower Planning) I. P. D Ministry of No. 1 Industry No. 192 Kaba Aye Pagoda Road Rangoon, Burma
China, People's Republic of	Cheng Zhengqing Assistant Director Shanghai Advanced Vocational-Technical Training Centre Shanghai Labour Bureau 52 Yi Xian Road Shanghai, China
Cook Islands	Charlie Kapuvai Head of Department Industrial Arts Tereora College P. O. Box 107 Rarotonga, Cook Islands
Hong Kong	Tsui See Ming Principal Hong Kong Technical Teachers' College 373 Queen's Road East Wanchai, Hong Kong
India	Jacob Oommen Regional Director (App. Training) Directorate General of Employment and Training Ministry of Labour Government of India Sion-Trombay Road Bombay 400022, India

Indonesia	Jorlin Pakpahan Director Technical Teacher Upgrading Centre (TTUC) Directorate of Technical and Vocational Education Jalan Pesantren, Cimahi-Utara Bandung, Indonesia
Japan	Yoichi Kimura Researcher Research Development Institute of Vocational Training 1960 Aihara Sagamihara Shi Kanagawa, Japan 229
Korea, Republic of	Park Hong Shik Chief, Training Administrative Division Central Vocational Training Institute 47, Kusandong, Bugku Inchon, Republic of Korea
Malaysia	Tan Bian Tong Head, Mechanical Department and Coordination of Trade Courses Technical Teachers' Training College (Maktab Perguruan Teknik) Jalan Tenteram Bandar Tun Razak 56000 Kuala Lumpur Semenanjong, Malaysia
Nepal	Lal Prasad Gyawali Assistant Director Technical and Vocational Education Directorate Ministry of Education and Culture Gyaneshwas Kathmandu, Nepal

Janak Raj Pant
Section Officer
Foreign Aid Division
Ministry of Finance
Bagdurbar
Kathmandu, Nepal

Pakistan
Mahmood Ahmad Khan
Principal
Swedish-Pakistani Institute of Technology
Lahore, Pakistan

Philippines
Nelson Garma
Manpower Development Chief
Regional Manpower Training Center
Tabang, Guiguinto
Bulacan, Philippines

Alcestis Guiang
Assistant Director
Bureau of Technical and Vocational Education
Department of Education, Culture and Sports
5th Floor Palacio del Gobernador
Intramuros
Manila, Philippines

Singapore
Eric Low Yeow San
Lecturer
Department of Social and Vocational Studies
Institute of Education
469 Bukit Timah Road
Singapore 1025
Republic of Singapore

Sri Lanka
M. Ariyadasa Cooray
Principal
National Technical Teachers' Training College

Waidya Road
Dehiwala, Sri Lanka

Imiyage Jayasena
Deputy Director
Foreman Training Institute
Ministry of Labour
354, Elvitigala Mawatha
Colombo 5, Sri Lanka

Thailand
Weena Pakawong
Chief
Instructional Development and
In-Plant Training Branch
National Institute for Skill Development
Department of Labour
Mit-Mitri Road, Dindeng
Bangkok 10400, Thailand

Tonga
Melino Kupu
Deputy Principal
Tonga Teachers' College
Nuku'alofa, Tonga

Vanuatu
Thomas Simon
Head
Vanuatu Institute of Education
Port Vila, Vanuatu

Western Samoa
Maresi Isaia
Acting Principal
Western Samoa Technical Institute
P.O. Box 861
Apia, Western Samoa

Representatives:

Employers
Narumi Sakiyama
Japan Federation of Employers' Associations
(NIKKEIREN), 1-4-6 Marunouchi,
Chiyoda-ku
Tokyo, Japan

Workers

Qu Lin
All China Federation of Workers
No. 10 Fuxingmengwai Street
Beijing, China

OBSERVERS

Gareth Howell
Regional Adviser on Training Systems and Policies
ILO Regional Office for Asia and the Pacific
United Nations Building
Rajdamnern Avenue
Sala Santitham
Bangkok 2, Thailand

Mokoto Tani
Deputy Director
Overseas Corporation Division
Human Resources Development Bureau
Ministry of Labor
1-2-2 Kasumigaseki
Chiyoda-ku
Tokyo, Japan

Yoichi Koike
Researcher
Institute of Developing Economies in Japan
42 Ichigaya Honmura-cho
Shinjuku-ku
Tokyo, Japan

Junko Mizuno
Researcher
Institute of Developing Economies in Japan
42 Ichigaya Honmura-cho
Shinjuku-ku
Tokyo, Japan

RESOURCE PAPERS AND PERSONS

Part One: Developing the Framework

Policy Framework for Trainer Training	Michael Bermant Senior Research Officer Training Policies Branch International Labour Office CH-1211 Geneva 22 Switzerland
Training Efficiency	Manish Nandy Management Consultant 41 San Geronimo Magallanes, Makati Metro Manila, Philippines
Promotion and Implementation of Technical Cooperation	Rony Diaz Director Asian Pacific Skill Development Programme (APSDEP) No. 15, Street 19, Sector F-8/2 Islamabad, Pakistan
Identification of the Principal Needs to Bring About Change	Ray Powell Overseas Project Corporation of Victoria Ltd. 11th Floor, 176 Wellington Parade, East Melbourne Victoria 3002, Australia

Part Two: Developing the System

The Role of Technical/ Vocational Teachers as Change Agents	Robert McCaig Director Colombo Plan Staff College for Technician Education Block C, University of Life Complex Meralco Avenue, Pasig Metro Manila, Philippines

Factors Affecting the Transfer of Knowledge and Skills	Ray Powell Overseas Projects Corporation of Victoria Ltd. 11th Floor, 176 Wellington Parade, East Melbourne Victoria 3002, Australia
Cost-Effective National Schemes	Jose D. Lacson Director Institute of Vocational Training and Development National Manpower and Youth Council South Superhighway, Taguig Metro Manila, Philippines
Job Conditions of Technical and Vocational Teachers	Harry Abrillo Managing Director - Operations Meralco Foundation, Inc. Ortigas Avenue, Pasig Metro Manila, Philippines
Training Technical and Vocational Teachers	Robert E. Norton Senior Research and Development Specialist National Center for Research in Vocational Education The Ohio State University 1960 Kenny Road Columbus, Ohio 43212 USA
Trade Skill Verification	H. Tachikawa Institute of Vocational Training 1960 Aihara Sagamihara Shi Kanagawa, Japan 229

Part Three: Developing the Instruments

Module Training in Japan	Setsuo Yasue Senior Researcher Research and Development Institute of Vocational Training 1960 Aihara Sagamihara Shi Kanagawa, Japan 229
Developing A Curriculum	Jamal Ud-Din Adviser on Trainer Training Asian Pacific Skill Development Programme (APSDEP) No. 15, Street 19, Sector F-8/2 Islamabad, Pakistan
Competency-Based Education and Training	Robert E. Norton Senior Research and Development Specialist National Center for Research in Vocational Education The Ohio State University 1960 Kenny Road Columbus, Ohio 43212 USA
Computer-Aided Instruction	Graham Hunt Director Lynn Hunt Instructional Systems Program Massey University Palmerston North New Zealand
Development and Utilization of Software	Robert McCaig Director Colombo Plan Staff College for Technician Education Block C, University of Life Complex Meralco Avenue, Pasig Metro Manila, Philippines

The Scope for Technical Cooperation Among Developing Countries

Ray Powell
Overseas Projects Corporation of Victoria Ltd.
11th Floor, 176 Wellington Parade, East Melbourne
Victoria 3002, Australia

National Resource Center

Jose D. Lacson
Director
Institute of Vocational Training and Development
National Manpower and Youth Council
South Superhighway, Taguig
Metro Manila, Philippines

Monitoring and Evaluation in Technical Teacher Training

Robert R. Buck
Deputy Manager for International Division
Donald K. Mitchell
Manager - Development
Division of International Teaching and Development
Hawthorn Institute of Education
Hawthorne 3122, Australia

REPRESENTATIVES

ILO - APSDEP

Rony Diaz
Director
Asian Pacific Skill Development Programme (APSDEP)

Jamal Ud-Din
Adviser on Trainers' Training
Asian Pacific Skill Development Programme (APSDEP)

Michael Bermant
Senior Research Officer

Training Policies Branch
Training Department
International Labour Office
Geneva, Switzerland

Government of Japan

Masayuki Nomiyama
Director-General
Human Resources Development Bureau
Ministry of Labor

Hisami Kurokochi
Deputy Director-General
Human Resources Development Bureau
Ministry of Labor

Tadao Sugama
Director
Overseas Cooperation Division
Ministry of Labor

Motoko Tani
Deputy Director
Overseas Cooperation Division
Ministry of Labor

Noriko Adachi
Section Chief
Overseas Cooperation Division
Ministry of Labor

Tadao Nagata
President
Overseas Vocational Training Association (OVTA)

Kazuo Sasaki
Executive Director
OVTA

Mitsuhiro Kajinaga
General Manager
OVTA

	Naoki Omori Manager OVTA
Asian Development Bank	Günther Schulz Vice-President (Projects) Projects
	Neil Collier Deputy Director Infrastructure Department
	G.H.P.B. van der Linden Manager, Education Division Infrastructure Department
	William Webb Senior Education Specialist Education Division Infrastructure Department

SECRETARIAT

Rumphai Bunlusilp
ILO ROAP
Bangkok, Thailand

Yuko Kamochi
OVTA
Japan

Naoki Omori
Manager, OVTA
Japan

Rosalia Sandoval
Education Division
Asian Development Bank
Philippines

Yuko Shinobe
OVTA
Japan

WORKSHOP PROGRAM

WORKSHOP PROGRAM
REGIONAL WORKSHOP ON TECHNICAL/VOCATIONAL TEACHER TRAINING

Overseas Vocational Training Association (OVTA) Center
Chiba City, Japan
11 – 22 May 1987

Week I Program

	MONDAY, 11 MAY	TUESDAY, 12 MAY	WEDNESDAY, 13 MAY	THURSDAY, 14 MAY	FRIDAY, 15 MAY
A. M.	Registration/ Orientation	Visit to the Institute of Vocational Training	Statement by Workshop Chairman J. Ud-Din	Job Requirements and Conditions of Employment I H. Abrillo	Competency-Based Education and Training I R. Norton
	Payment of Daily Subsistence Allowance	Continuation of Visit	Policy Framework for Trainer Training M. Bermant	Job Requirements and Conditions of Employment II H. Abrillo	Competency-Based Education and Training II R. Norton
P. M.	Opening Ceremonies	Continuation of Visit	Identification of Principal Needs to Bring About Change R. Powell	History of Research K. Toda	Syndicate Sessions: 1. Policy Matters 2. Conditions of Employment
	Dinner Reception hosted by Ministry of Labour, Japan	Continuation of Visit	Role of Technical and Vocational Teachers as "Change Agents" R. McCaig	Outline of Present Situation in Research S. Yasue	Continuation of Syndicate Sessions

Week II Program

	MONDAY, 18 MAY	TUESDAY, 19 MAY	WEDNESDAY, 20 MAY	THURSDAY, 21 MAY	FRIDAY, 22 MAY
A. M.	Report of Syndicates DACUM J. Ud-Din	Computer Aided Instruction I G. & L. Hunt	Monitoring and Evaluation Techniques R. Buck/ D. Mitchell	Presentation of Syndicate Reports Training Technical and Vocational Teachers — Norton	Presentation of Syndicate Reports Scope for Technical Cooperation R. Powell
	Cost-Effective National Schemes and National Resource Center J. Lacson	Computer Aided Instruction II G. & L. Hunt	Application of Developed Country Model R. Buck/ D. Mitchell	Teacher and Trainer Competency Testing R. Norton	Promotion and Implementation of TCDC by APSDEP R. Diaz
P. M.	Factors Affecting Transfer of Knowledge and Skills R. Powell	Syndicate Sessions: 1. Curriculum Development 2. Cost-Effective Trainer Training Schemes	Demonstration of WICAT System G. & L. Hunt	Syndicate Sessions Technical and Vocational Teacher Training: Remaining Issues	Review and Approval of Workshop Conclusions and Recommendations
	Internal and External Efficiency of Training M. Nandy	Continuation of Syndicate Sessions	Development and Utilization of Software R. McCaig	Continuation of Syndicate Sessions Distribution of Evaluation Questionnaire	Closing Ceremonies Dinner Reception hosted by ADB